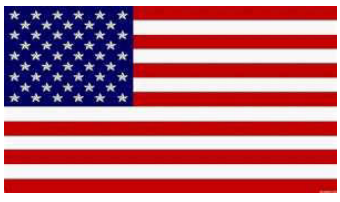
YUKON RIVER SALMON 2015 SEASON SUMMARY AND 2016 SEASON OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

March 2016
Regional Information Report 3A16-01
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518, USA



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

REGIONAL INFORMATION REPORT 3A16-01

YUKON RIVER SALMON 2015 SEASON SUMMARY AND 2016 SEASON OUTLOOK

by
The United States and Canada
Yukon River Joint Technical Committee

Alaska Department of Fish and Game
Division of Commercial Fisheries
333 Raspberry Road
Anchorage, AK 99518, USA

March 2016

The Regional Information Report Series was established in 1987 and was redefined in 2007 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as area management plans, budgetary information, staff comments and opinions to Alaska Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.adfg.alaska.gov/sf/publications/

This document should be cited as follows:

JTC (Joint Technical Committee of the Yukon River U.S./Canada Panel). 2016. Yukon River salmon 2015 season summary and 2016 season outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A16-01, Anchorage.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

LIST OF APPENDICES (Continued)

1.0 ABSTRACT

The Joint Technical Committee (JTC) of the United States and Canada meets twice a year to analyze and discuss harvest and escapement goals, management trends, postseason reviews, preseason outlooks, and results of cooperative research projects. This report summarizes the status of Chinook *Oncorhynchus tshawytscha*, coho *O. kisutch*, and summer and fall chum salmon *O. keta* stocks in 2015, presents a 2016 season outlook, and provides data on salmon harvests in commercial, subsistence, aboriginal, personal use, domestic, and sport or recreational fisheries. Summaries of Yukon River research projects and a list of 2015 Restoration and Enhancement Fund projects are also included. For 2015, the preliminary estimate of Chinook salmon spawning escapement in Canada was 83,000 fish, exceeding the upper end of the interim management escapement goal (IMEG) range of 42,500–55,000 fish. A preliminary estimate of the Canadian-origin Chinook salmon run was 87,000 fish. The preliminary spawning escapement estimate of Canadian-origin mainstem Yukon River fall chum salmon was 108,658 fish, exceeding the upper end of the IMEG range of 70,000 to 104,000 fish. A spawning escapement estimate of 20,822 Canadian-origin Porcupine River fall chum salmon was obtained from a sonar project near Old Crow. An escapement estimate for the Fishing Branch River of 8,351 fish was obtained from a weir project. This estimate was below the lower bound of the IMEG range of 22,000–49,000 fish. Recommended interim management escapement goals for upper Yukon River Chinook and chum salmon and upper Porcupine River chum salmon in 2016 are the same as for 2015.

Key words: Chinook salmon *Oncorhynchus tshawytscha*, chum salmon *O. keta*, coho salmon *O. kisutch*, Yukon River, Yukon River Salmon Agreement, Joint Technical Committee, escapement, escapement goal, interim management escapement goal IMEG, management strategy, season outlook.

2.0 INTRODUCTION

The United States (U.S.) and Canada Yukon River Joint Technical Committee (JTC) was established in 1985 and serves as a scientific advisory body to the Yukon River Panel. This annual report covers salmon fishery and management topics addressed by the JTC following the 2015 season and preceding the 2016 season, in accordance with the Yukon River Salmon Agreement.[1]

The JTC meets semi-annually to discuss harvest and escapement goals, management strategies, preseason outlooks and postseason reviews, and results of cooperative research projects. The fall meeting was held November 17–19, 2015 in Seattle, Washington. The spring meeting was held February 22–24, 2016 by video conference, with the host site in Whitehorse, Yukon Territory, and remote sites in Anchorage and Fairbanks, Alaska and Kamloops, British Columbia.

Preliminary postseason fishery reviews were presented and discussed during the fall meeting. These included presentations by U.S. and Canadian members on management, stock assessment, harvests, and escapement of Chinook *Oncorhynchus tschawytscha* and fall chum *O. keta* salmon; salmon bycatch in the Bering Sea and Gulf of Alaska trawl fisheries; and marine research surveys. Additional time was devoted to reviewing the assessment of the upper Porcupine and Fishing Branch River fall chum salmon stock.

In the spring meeting, the JTC reviewed preseason outlooks and management plans for the upcoming 2016 season. Additional technical discussions were held on marine survey results and a change in species apportionment estimation methods at the Pilot Station sonar project. Subcommittees also presented draft documents or updates on standards for sonar and restoration projects.

[1] The Yukon River Salmon Agreement appears as Chapter 8 in the Pacific Salmon Treaty, http://www.psc.org/pubs/Treaty/Treaty.pdf.

Review of 2016 Yukon River Salmon Restoration and Enhancement (R&E) Fund detailed proposals was conducted prior to the fall JTC meeting and recommendations to the Panel were finalized at the fall meeting and presented to the Panel during its December meeting. The Panel made requests for clarifications or modifications on some proposals, and the JTC reviewed the responses to those requests during the spring meeting.

JTC membership and meeting attendance:

Bill Bechtol, fall only, Tanana Chiefs Conference (TCC)
Bonnie Borba, Alaska Department of Fish and Game (ADF&G)
Caroline Brown, ADF&G
Randy Brown, U.Ss Fish and Wildlife Service (USFWS)
Holly Carroll, ADF&G
Jan Conitz (U.S. co-chair), ADF&G
Michael Crowe, Fisheries and Oceans Canada (DFO), fall only
Jeff Estenson, ADF&G
Jason Hwang, DFO
Mary Ellen Jarvis, DFO
Elizabeth MacDonald, DFO, spring only
Gerald Maschmann, USFWS
Brian McKenna, alternate, spring only, TCC
Nathan Millar (Canadian co-chair), DFO
Jim Murphy, NOAA, fall only
Stephanie Schmidt, ADF&G
Chris Stark, Bering Sea Fishermen's Association (BSFA)
Trix Tanner, DFO
Don Toews, Yukon Salmon Subcommittee (YSSC)
Maggie Wright, DFO

Guest presenter (spring): Kathrine Howard, ADF&G

Over time, U.S. and Canadian researchers have developed projects to monitor escapement and to determine genetic composition, relative abundance, run characteristics, and other information to characterize the annual salmon migration in the Yukon River. Mainstem river sonar, tributary sonar, weir, counting tower projects, and aerial surveys are used to monitor escapement. Other information collected can include run timing, catch per unit of effort (CPUE), salmon sex and length composition, scales or vertebra for age determination, tissue samples for genetic stock identification, data on resident species, and information from recovery of tagged fish from various projects. Harvest is monitored through voluntary or required reporting, and in Alaska, subsistence harvest is estimated from information collected in community surveys. Various government agencies, non-government organizations, and private contractors operate projects throughout the drainage (Appendices A7 and A8).

Summaries of these projects and information used to assess escapement and stock status and provide run outlooks are presented in this report. Although most data sets have been fully compiled and most analyses completed prior to publication of this report, much of the information from the 2015 season was preliminary at the time of writing. Other published, peer reviewed sources should be consulted for definitive documentation of postseason information.

The annual management report for the Yukon Area is published within the ADF&G Fishery Management Report series by year (e.g. Estensen et al. 2015, http://www.adfg.alaska.gov/sf/publications/). All Alaska subsistence and personal use harvest data are considered preliminary until the relevant ADF&G Fisheries Data Series reports (e.g. Jallen et al. 2015, http://www.adfg.alaska.gov/sf/publications/) are published.

This report is focused on Chinook and fall chum salmon stocks that occur on both sides of the international border, and more specifically on salmon originating in Canadian waters and addressed by the Yukon River Salmon Agreement. Two genetically distinct runs of chum salmon enter the Yukon River, an early summer component and a later fall component. Summer chum salmon are characterized by earlier run timing (early June to mid-July at the river mouth), rapid maturation in freshwater and smaller body size (average 6–7 pounds). Summer chum salmon spawn primarily in run-off streams in the lower 700 miles of the Yukon River drainage and in the Tanana River drainage. Fall chum salmon are distinguished by later run timing (mid-July to early September at the mouth), robust body shape, and larger body size (average 7–8 pounds). Fall chum salmon primarily spawn in the upper portion of the drainage in streams that are spring fed or geologically have strong upwelling features. Major fall chum salmon spawning areas include the Tanana, Porcupine, and Chandalar river drainages in Alaska, as well as various streams in the Yukon Territory, Canada, including the Kluane and mainstem Yukon River. Like summer chum salmon, few coho salmon *O. kisutch* are bound for the upper reaches of the Yukon River in Canada, with the exception of a Porcupine River population. Most Yukon River coho salmon spawn in the lower 700 miles of the drainage, including the Tanana River drainage.

3.0 ALASKA MANAGEMENT OVERVIEW

3.1 CHINOOK AND SUMMER CHUM SALMON

The Yukon River drainage in Alaska is divided into fishery districts and subdistricts for management purposes (Figure 1). Management of the Yukon Area summer season mainstem commercial salmon fisheries is in accordance with the *Policy for the Management of Sustainable Salmon Fisheries* 5 ACC 39.222, the *Yukon River Drainage King Salmon Management Plan* 5 ACC 05.360, and the *Yukon River Summer Chum Salmon Management Plan* 5 ACC 05.362. The management plan for Chinook salmon also stipulates a first pulse closure in the subsistence fishery intended to protect Canadian-origin Chinook salmon, regardless of preseason forecasted run size, to help ensure Yukon River Salmon Agreement escapement and harvest-sharing objectives will be met. The summer chum salmon management plan establishes run size thresholds needed to allow subsistence, commercial, sport, and personal-use fishing, prioritizing subsistence use. Additionally, because summer chum salmon and Chinook salmon migrate concurrently, regulations in the management plan allow for using selective gear types during times of Chinook salmon conservation that target summer chum salmon and allow immediate release of Chinook salmon back to the water alive. These regulations help ensure Chinook salmon escapement objectives will be met in low run years and providing fishing opportunity on the more abundant summer chum salmon runs.

Preseason, a management strategy is developed in cooperation with federal managers, fishermen, tribal council representatives, and other stakeholders that outlines run and harvest outlooks along with management actions that may be implemented over the course of the summer season. Before the arrival of salmon, subsistence fishing is allowed 7 days a week to provide opportunity to harvest non-salmon species such as whitefish *Coregonus* spp., sheefish *Stenodus leucichthys*,

northern pike *Esox lucius*, and longnose suckers *Catostomus catostomus*. As the season progresses, ADF&G uses an adaptive management strategy that evaluates run strength to determine if a harvestable surplus exists above escapement requirements and subsistence uses.

Preseason Management Strategy Planning

The Canadian-origin run of Yukon River Chinook salmon in 2015 was projected to be 59,000–70,000 fish, and the total run size for the entire drainage (U.S. and Canada) was expected to be 118,000–140,000 fish. For Canadian-origin Chinook salmon, the interim management escapement goal (IMEG) range recommended by the Yukon River Panel was 42,500 to 55,000 fish. As in recent years, initial management would be based on the expectation that the 2015 Chinook salmon run size would likely be near the lower end of this range. Achieving escapement objectives was expected to be challenging with this run size and conservation measures would be necessary. Before the 2015 season, the Yukon River Drainage Fisheries Association (YRDFA) facilitated a meeting with U.S. management agencies (ADF&G and USFWS), fishermen, tribal council representatives, and other stakeholders to develop a preseason management strategy. The purpose of this meeting was to cooperatively identify practical management strategies that would achieve the following goals: ensure adequate numbers of Chinook salmon reach their spawning grounds in Alaska and Canada, minimize the harvest of Chinook salmon, and provide ample opportunity to harvest abundant summer chum salmon and non-salmon species.

After break-up, but prior to Chinook salmon entering the river, subsistence fishing on non-salmon species would be provided with 6-inch or smaller mesh size gillnets. When subsistence reports or test fishing projects indicated Chinook salmon were present in the lower Yukon River, subsistence salmon fishing closures would be enacted. These subsistence salmon fishing closures would be implemented in upriver districts and tributaries, including the Koyukuk, Innoko, and Tanana rivers, as Chinook salmon migrated upstream. Throughout salmon subsistence closures, subsistence fishing with 4-inch or smaller mesh size gillnets not exceeding 60 feet in length would be allowed to harvest non-salmon species. Managers strongly encouraged fishermen to avoid fishing in areas where Chinook salmon were likely to be encountered. When summer chum salmon become abundant, subsistence fishing would be opened using selective fishing gear (e.g., dip nets, beach seines, and live-release fish wheels) to allow for the quick, live, release of incidentally-caught Chinook salmon. Subsistence restrictions would be relaxed after the Chinook salmon run passed through each district. If inseason assessment projects indicated that escapement goals would be met, the use of 6-inch gillnets would be considered to allow more efficient harvest of summer chum salmon between pulses of Chinook salmon or when the incidental harvest of Chinook salmon was expected to be low. An informational flyer detailing these planned conservation strategies was mailed to Yukon River commercial permit holders and approximately 2,900 families identified from ADF&G's survey and permit databases.

Fishery managers would base initial management on the expectation that the Chinook salmon run would come in at the lower end of the preseason projection. Consequently, the regulatory subsistence fishing schedule (Table 1) would be altered by closures to conserve Chinook salmon. The objectives of the altered subsistence schedule were to 1) protect the first and, possibly, second pulse of Chinook salmon (those containing the highest proportion of Canadian-origin stocks), 2) reduce harvest early in the summer chum salmon run when there is a higher level of uncertainty, 3) spread the harvest throughout the summer chum salmon run to reduce impacts on any particular component of the run, and 4) distribute subsistence fishing opportunity among all

users. It was unlikely that districts and subdistricts would be on their regulatory subsistence schedule until the Chinook salmon run was almost complete in a given district or subdistrict.

Managers anticipated a commercially harvestable surplus of summer chum salmon above escapement and subsistence needs. However, the extent of a directed summer chum salmon commercial fishery would be dependent upon the strength and timing of the Chinook salmon run. The sale of incidentally-caught Chinook salmon would be prohibited for the entire season. Early in the season, selective fishing gear, including dip nets and beach seines, would be employed during commercial summer chum salmon fishing to reduce the incidental harvest of Chinook salmon. Later in the season, 6-inch or smaller mesh size gillnets were expected to be utilized when the incidental harvest of Chinook salmon was anticipated to be low.

Table 1.–Yukon Area regulatory subsistence salmon fishing schedule.

Area	Regulatory subsistence fishing periods	Open fishing times
Coastal District	7 days per week	M/T/W/TH/F/SA/SU - 24 hours/day
District 1	Two 36-hour periods per week	Mon 8 pm to Wed 8 am / Thu 8 pm to Sat 8 am
District 2	Two 36-hour periods per week	Wed 8 pm to Fri 8 am / Sun 8 pm to Tue 8 am
District 3	Two 36-hour periods per week	Wed 8 pm to Fri 8 am / Sun 8 pm to Tue 8 am
District 4	Two 48-hour periods per week	Sun 6 pm to Tue 6 pm / Wed 6 pm to Fri 6 pm
Koyukuk and Innoko Rivers	7 days per week	M/T/W/TH/F/SA/SU - 24 hours/day
Subdistricts 5-A, -B, -C	Two 48-hour periods per week	Tue 6 pm to Thu 6 pm / Fri 6 pm to Sun 6 pm
Subdistrict 5-D	7 days per week	M/T/W/TH/F/SA/SU - 24 hours/day
Subdistrict 6	Two 42-hour periods per week	Mon 6 pm to Wed Noon / Fri 6 pm to Sun Noon
Old Minto Area	5 days per week	Friday 6 pm to Wednesday 6 pm

Note: This schedule was subject to change depending on run strength.

Inseason Run Assessment

The U.S. management agencies (ADF&G; USFWS) monitor a suite of assessment projects that provide critical data on salmon run timing, relative abundance, and stock composition of salmon. Information from multiple assessment projects are corroborated when available to provide the best possible assessment. Initial assessment in the lower Yukon River is critical to implementing an inseason management plan to operate an orderly fishery throughout the drainage. Three projects in the lower Yukon River provided inseason abundance and timing information. First, Lower Yukon test fishery (LYTF) is a set gillnet project using 8.5-inch mesh primarily designed to assess Chinook salmon run timing and is operated in the Middle and South Mouths of the Yukon River. Second, a summer chum salmon-directed drift gillnet test fishery, which uses 5.5-inch mesh nets, is operated in the Middle and South Mouths of the Yukon River. Third, a mainstem Yukon River sonar project operated near the community of Pilot Station provides abundance estimates for Chinook and summer chum salmon. Additional drift test fishing was conducted throughout the 2015 season in the South Mouth at the Big Eddy site with 8.25-inch mesh drift gillnets for Chinook salmon to provide supplemental run timing and relative abundance information. Given the anticipated low run size, efforts were made by ADF&G this year to reduce Chinook salmon mortality in test fisheries. This included releasing Chinook salmon from test drift gillnets when their condition was deemed acceptable. Due to their lower

mortality rates, drift gillnets replaced set gillnets in the test fishery in the South Mouth for Chinook salmon early in the season.

Ice breakup in the lower Yukon River occurred May 18 to 19, which was a week earlier than the average breakup date of May 25 (based on the years 1961–2014). During this early portion of the Chinook salmon run, ADF&G monitored subsistence harvest reports from fishermen closely and relied on this information to guide initial management actions.

The LYTF was operational at the South Mouth site on May 28 and at the Middle Mouth site on June 6. The first Chinook salmon was caught in the test fishery on May 28. In an effort to reduce Chinook salmon mortality in the LYTF, the set gillnet sites in South Mouth were discontinued after June 13. Additionally, only one set gillnet site was operated in the Middle Mouth to further reduce Chinook salmon mortality. The LYTF was concluded on July 13 with a cumulative CPUE of 39.63, which was above the historical average[2] CPUE of 20.04. The first quarter point, midpoint, and third quarter point of Chinook salmon run timing in 2015 were June 15, 25, and 30, respectively (Figure 2). The 8.25-inch drift gillnet project for Chinook salmon operated in Big Eddy until July 15 and provided valuable supplemental assessment information for Chinook salmon entering the South Mouth of the Yukon River. In accordance with the goal of reducing Chinook salmon mortality, 667 (45%) Chinook salmon were released from the LYTF drift gillnets and the remainder was given to local households for subsistence use.

The preliminary cumulative passage estimate at the mainstem Yukon River sonar project operated near Pilot Station[3] was approximately 116,000 ± 30,000 (90% CI) Chinook salmon, which was below the historical average[4] of 143,600. Inseason run assessment analysis was focused on making comparisons to years with similar run timing in order to make informed management decisions. However, assessment of the 2015 run timing was complicated by the early entry of Chinook salmon into the river after an early ice-out followed by a delayed buildup of fish in the river. The first quarter point, midpoint, and third quarter point for the mainstem Yukon River sonar project operated near Pilot Station were on June 18, 24, and 29, respectively. Although the 2015 Chinook salmon run began entering the river early, the run timing ended up being close to the historical average.

Inseason genetic mixed stock analysis (MSA) on the first pulse of Chinook salmon at the mainstem Yukon River sonar project operated near Pilot Station (May 30–June 17) indicated that 50% were Canadian-origin Chinook salmon. Genetic MSA on the second pulse of Chinook salmon at the sonar (June 18–25) indicated that 39% were Canadian-origin Chinook salmon. Samples analyzed from June 26 to July 2 indicated that 31% were Canadian-origin Chinook salmon[5]. The results of the genetic MSA suggested a weaker contribution of the Canadian-origin stock to the overall Chinook salmon run size than in 2014.

---

[2] Includes years 1998–2011. The years of 2012–2014 were not included due to project difficulties.

[3] For more background information on ADF&G operated sonar projects including the Pilot Station site on the Yukon River, refer to the ADF&G sonar webpage, http://www.adfg.alaska.gov/index.cfm?adfg=sonar.site&site=12.

[4] Average includes years 1995, 1997, 2000, 2002–2008, and 2010–2014. The sonar did not operate in 1996 and project difficulties occurred in 2000, 2001, and 2009.

[5] For more background information on genetic MSA for Yukon River Chinook salmon and related topics and updates, refer to the ADF&G Gene Conservation Laboratory webpage, http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.yukonchinook_baseline.

Chinook Salmon Inseason Management

Before Chinook salmon entered the Yukon River, subsistence fishing in the Coastal District and Districts 1–2 was open 7 days per week with 6-inch or smaller mesh size gillnets as outlined in the preseason management plan. Districts 3–5 were open for subsistence fishing 24 hours a day, 7 days per week, with 7.5-inch or smaller mesh gillnets, and District 6 and Old Minto Area were on their regulation subsistence schedules (Table 1). The first Chinook salmon was harvested by a subsistence fisherman in the lower Yukon River on May 27. The following day, the first Chinook salmon was caught in LYTF near Emmonak. Subsistence fishing was closed in the northern portion of the Coastal District and in Districts 1–2 beginning May 30. The northern portion of the Coastal District remained closed until July 9. Subsistence salmon closures were implemented in upriver districts as Chinook salmon migrated upstream; District 3 closed on June 4; Subdistrict 4-A Lower closed on June 5; Subdistrict 4-A Upper closed on June 8; Subdistricts 4-B and 4-C closed on June 10; and Subdistricts 5-A, 5-B, and 5-C closed on June 14. Closures in Subdistricts 5-D Lower, Middle, and Upper were delayed until the first pulse of Chinook salmon arrived, in order to allow some subsistence opportunity on early fish in an area that often sees the most conservative management actions. Gear was restricted to 6-inch or smaller mesh gillnets to protect larger Chinook salmon. Closures in Subdistricts 5-D Lower, Middle, and Upper occurred on June 29, July 3, and July 5. Closures were expected to be in place for nearly the entire duration of the run for the majority of the river. Subsistence fishermen could use 4-inch or smaller mesh size gillnets during closures to target non-salmon species. Four pulses of Chinook salmon passed the mainstem Yukon River sonar project near Pilot Station on June 13, 18, 24, and 27.

Early assessment information from both the mainstem Yukon River sonar project near Pilot Station and genetic analysis indicated a weaker than expected Canadian-origin Chinook salmon run, but that the run size was likely large enough to meet the border objective and to support a small incidental harvest of Chinook salmon. Subsistence fishing opportunities with gillnets restricted to 6-inch or smaller mesh were provided in Districts 1–4 between Chinook salmon pulses to more efficiently harvest summer chum salmon, and minimizing the incidental harvest of Chinook salmon. These gillnet openings were intended to target large groups of summer chum salmon passing through the area, and any incidentally-caught Chinook salmon could be kept for subsistence purposes. Efforts were made to protect Canadian-origin Chinook salmon in areas where the Alaska and Canadian stocks segregate and bank-orient. For example, subsistence salmon fishing in Subdistrict 4-B (right bank as facing with the flow) remained restricted to selective gear types and gillnet opportunity was not provided until late in the season since Canadian-origin stocks primarily migrate along the right bank of the mainstem Yukon River in that area.

As the Chinook salmon run progressed, inseason assessment projects indicated that the run was better than anticipated; however, it was still a below average run. Once summer chum salmon became abundant, subsistence opportunity was provided 24 hours a day, 7 days per week, with dip net gear in Districts 1–3 and with dip nets and live-release fish wheels in District 4. Fishermen were required to immediately release Chinook salmon alive from these selective gear types. Because very few summer chum salmon migrate through District 5 and any subsistence opportunity provided would likely target Canadian-origin Chinook salmon this district often experiences the most restrictive management measures.

Conservative management actions were also taken in Yukon River tributaries in an effort to provide protection for U.S. Chinook salmon stocks. In the Tanana River (Subdistricts 6-A and 6-B), subsistence salmon fishing remained on its regulatory schedule of two 42-hour periods per week for the entirety of the Chinook salmon season. However, gear was restricted to 6-inch or smaller mesh size gillnets and manned fish wheels. On July 17, fishermen were no longer required to attend their fish wheels and could retain Chinook salmon for subsistence use. In Subdistrict 6-C, personal use salmon fishing was closed from June 19 to July 16, spanning nearly the entire duration of the Chinook salmon run. The Koyukuk and Innoko rivers were closed to subsistence salmon fishing from June 25 to July 3 and June 26 to July 3. Subsistence salmon fishing reopened in both Koyukuk and Innoko 24 hours a day, 7 days per week with gillnets restricted to 6-inch or smaller mesh to target summer chum salmon beginning July 4. This gear restriction was in place for the remainder of the Chinook salmon run in both tributaries.

Once the majority of the Canadian-origin Chinook salmon run was through each district and confidence was gained that the border objective would be achieved, subsistence salmon fishing restrictions were relaxed in each district. The use of selective gear types was discontinued in the lower and middle Yukon River districts and subsistence salmon fishing opportunities were provided with gillnets restricted to 6-inch or smaller mesh size. Near the very end of the Chinook salmon run in District 5, fishermen could use 7.5-inch or smaller mesh set gillnets and fish wheels to harvest salmon, as the upper end of the border objective had been exceeded.

Throughout the season, weekly teleconferences were facilitated by YRDFA to provide managers, fishermen, tribal council representatives, and other stakeholders the opportunity to share information, provide input, and discuss inseason management options. During these weekly teleconferences, ADF&G and USFWS staff provided inseason run assessment information and upcoming management strategies; subsistence fishermen provided reports on fishing effort and water conditions in their respective communities along the river.

2015 Summer Chum Salmon Outlook

The strength of the summer chum salmon run in 2015 was largely dependent on production from the 2011 (age-4 fish)[6] and 2010 (age-5 fish) escapements as these age classes dominate the run. The 2015 preseason run outlook was for a run size of approximately 1.8–2.4 million summer chum salmon. A run of this size was anticipated to provide for escapements, a normal subsistence harvest, and a potential commercial harvest of 800,000 to 1,400,000 summer chum salmon. Similar to previous years, the actual commercial harvest of summer chum salmon would likely be affected by a poor Chinook salmon run, in that incidental harvest of Chinook salmon in chum salmon-directed fisheries would need to be minimized.

Summer Chum Salmon Inseason Run Assessment and Management

The Yukon River summer chum salmon run was managed according to the guidelines described in the *Yukon River Summer Chum Salmon Management Plan* (Appendix A1). The management plan provides for escapement needs and subsistence use priority before other consumptive uses such as commercial, sport, and personal use fishing. The plan allows for varying levels of harvest opportunity depending on the run size projection. ADF&G uses the best available data to assess

[6] Ages of salmon in this report are presented as total age, from egg-in-gravel to return as spawner, rather than the commonly used decimal (European) notation indicating freshwater and saltwater years.

the run, including preseason run outlooks; passage estimate at the mainstem Yukon River sonar project near Pilot Station; test fishing indices; age, sex, and length (ASL) composition; subsistence and commercial harvest reports; and information from escapement monitoring projects.

Approximately 1.4 million ± 100,000 (90% CI) summer chum salmon passed the mainstem Yukon River sonar project near Pilot Station, which is below the historical median for the project. The first quarter, midpoint, and third quarter points were June 21, June 28, and July 2. The first and third quarter points were earlier than historical average quarter points (June 23, June 28, and July 8, respectively, for years 1995–2014 not including 1996, 2001, and 2009). Four large pulses of summer chum salmon were detected; the largest group, approximately 362,000 fish, passed the sonar project from June 27 to July 29. Liberal commercial fishing opportunity was provided to target the available surplus of summer chum salmon in Districts 1, 2, and 6. At the same time, a suite of strategies were used to conservatively manage these fisheries to minimize the incidental harvest of Chinook salmon.

Utilizing new regulations adopted by the Alaska Board of Fisheries (BOF) in 2013, ADF&G allowed for the commercial harvest of summer chum salmon using dip nets and beach seines beginning June 11 in District 1 and June 15 in District 2. The impact to Chinook salmon was expected to be minimal as fishermen were required to immediately release incidentally caught Chinook salmon back to the water alive. Additionally, concurrent subsistence and commercial fishing periods were regularly instituted throughout the commercial fishing season. Concurrent openings streamlined commercial and subsistence fishing into a single event, thereby reducing the amount of time that Chinook salmon were susceptible to harvest. However, subsistence only fishing periods were regularly provided in the mornings prior to commercial fishing periods and all day Saturdays to provide subsistence users a less competitive opportunity to harvest summer chum salmon. ADF&G allowed two 10-hour and seventeen 12-hour subsistence periods in District 1 and twenty 10-hour subsistence periods in District 2 using dip nets and beach seines only.

In 2015, the use of gillnet gear was delayed until inseason assessment indicated the majority of the Chinook salmon run had migrated upriver in an effort to reduce the incidental harvest on them. In District 1 only, commercial opportunity with 5.5-inch or smaller mesh size gillnets, not exceeding 30 meshes in depth, was provided for 3 periods in a further attempt to reduce the incidental harvest of Chinook salmon. Once managers were confident that the majority of the run had migrated out of each district, commercial opportunity with 6-inch gillnet gear was provided for the remainder of the summer season beginning July 7 in District 1 and July 6 in District 2.

The sale of incidentally caught Chinook salmon was prohibited during the entire commercial fishing season (both summer and fall seasons). This action helped ensure fishermen would not target Chinook salmon during gillnet commercial fishing periods; and fishermen could either release incidentally caught Chinook salmon alive or use them for subsistence purposes. It was required to report any Chinook salmon retained but not sold on commercial fish tickets.

No commercial fishery operated in District 4 in 2015 due to a lack of a buyer. District 6 was managed using inseason assessment information provided by genetic MSA collected at the mainstem Yukon River sonar project near Pilot Station and tributary escapement projects in the Tanana River drainage. A harvestable surplus of summer chum salmon was expected based upon sonar abundance estimates and genetic stock composition information. Given the available

surplus and favorable market interest, ADF&G scheduled the first summer chum salmon directed commercial fishing period in District 6 on July 13. In line with conservative actions taken in the lower Yukon River commercial fishery, commercial fishing gear was initially restricted to "fish-friendly" manned fish wheels and all Chinook salmon caught in fish wheels had to be immediately released alive. Gear restrictions were relaxed on July 24 after Chinook salmon escapement goals on the Chena and Salcha rivers were met. Starting July 24, fishermen were allowed to use 6-inch or smaller mesh size gillnets and were no longer required to attend their fish wheels or release Chinook salmon. The department scheduled a total of 8 commercial fishing periods in District 6.

3.2 FALL CHUM AND COHO SALMON

Management of the Yukon Area fall season commercial salmon fisheries is in accordance with the Policy for the *Management of Sustainable Salmon Fisheries* 5 ACC 39.222, the *Yukon River Drainage Fall Chum Salmon Management Plan* 5 ACC 1.249, the *Yukon River Coho Salmon Management Plan* 5 ACC 05.369, and the *Tanana River Salmon Management Plan* 5 AAC 05.367. The threshold number of fall chum salmon needed to allow commercial fishing is 500,000 fish (Appendix A5) and commercial fishing is generally allowed only on the surplus above that level. The fall chum salmon plan incorporates Yukon River Salmon Agreement objectives for border passage of fall chum salmon and provides guidelines necessary for escapement and prioritized uses. The intent of the plan is to align management objectives with the established escapement goals, provide flexibility in managing subsistence harvests when stocks are low, and bolster salmon escapement as run abundance increases. The sustainable escapement goal (SEG) range for the Yukon River drainage is 300,000 to 600,000 fall chum salmon. There are provisions in the plan to allow incremental levels of subsistence salmon fishing balanced with requirements to attain escapement objectives during low runs. In 2015, fishing for fall chum salmon in the Porcupine River was closed from August 22 until the end of the season.

The coho salmon plan allows a coho salmon directed commercial fishery in the absence of achieving the threshold number of fall chum salmon if a harvestable surplus of coho salmon exists and a commercial fishery will not have a significant impact on fall chum salmon escapement and allocation. Finally, under the Tanana River plan, commercial fishing in Subdistrict 5-A and District 6 is based on the assessment and timing of salmon stocks bound for the Tanana River drainage.

Fall Chum Salmon Management Overview

ADF&G monitored a suite of assessment projects that provided salmon run timing, relative abundance, and stock composition information. Projects operated in the lower Yukon River included 2 drift gillnet test fisheries, a mainstem Yukon River sonar providing abundance estimates, and subsistence and commercial harvest information. Genetic samples collected from chum salmon at the mainstem Yukon River sonar near Pilot Station provided stock composition information. Additional projects were operated in the upper Yukon River tributaries and the upper mainstem of the Yukon River. Assessment projects operated in the upper Yukon River included a fish wheel video project located near Rampart Rapids, sonars operated in the mainstem Yukon River near the U.S./Canada border as well as in 2 tributaries (Chandalar and Porcupine rivers), and a weir on the Fishing Branch River (upper Porcupine River). ASL information were collected at the lower Yukon River test fisheries and various upriver

escapement projects.

By regulation, the fall season began in District 1 on July 16. Chum salmon caught in the LYTF after July 16 were considered fall chum salmon. Mountain Village drift gillnet test fishery began operation on July 18 and the mainstem Yukon River sonar near Pilot Station began counting chum salmon as fall chum salmon on July 19. Initial management was based on the preseason run projection of 700,000 to 800,000 fall chum salmon. All districts and subdistricts were placed on their full regulatory subsistence fishing schedules commensurate with switching over to fall management. By August 8, subsistence fishing in all mainstem districts (1–5) was open 7 days per week, 24 hours per day. The LYTF ceased operations on September 20[7] and had a cumulative CPUE for fall chum salmon of 1,353 which is above the historical median of 1,286. The Mountain Village drift gillnet test fishery ceased operations on September 11 with a cumulative CPUE for fall chum salmon of 1,682, which is below the historical median of 2,053. Finally, the mainstem sonar near Pilot Station ceased operations on August 31, about a week earlier than the date the project has normally ceased operation since 2008. The preliminary fall chum salmon passage estimate at the sonar near Pilot Station was 546,894 fish ± 44,039 (90% CI), which is below the historical median of 622,049 fish. Six pulses of fall chum salmon were detected, with the largest pulse, approximately 120,000 fish, having finished passing the sonar by July 22 (Figure 3). Run timing for fall chum salmon averaged 3 days late over all the assessment projects.

Coho Salmon Management Overview

The preliminary coho salmon passage estimate at the mainstem sonar project near Pilot Station was 97,587 fish ± 15,280 (90% CI), which is below the historical median of 121,023 fish. A portion of the coho salmon run was missed because the mainstem sonar operations ceased prior to the completion of the run. Based on daily catches in the LYTF, which operated until September 20, no additional large pulses of coho salmon were observed during the extended operations. Run timing for coho salmon was average in the majority of the assessment projects. Coho salmon daily and cumulative passages past the mainstem Yukon River sonar were mostly below median the entire season (Figure 4). ADF&G identified a surplus of coho salmon in addition to what was harvested in the fall chum salmon commercial fishery and allowed a coho salmon directed fishery in Districts 1 and 2 from September 1 to September 5.

4.0 ALASKA HARVEST SUMMARIES

4.1 SUBSISTENCE SALMON FISHERY

Subsistence salmon fishing activities in the Yukon River drainage typically begin in late May and continue through early October. Fishing opportunity in the Lower Yukon Area in May and the Upper Yukon Area in October is highly dependent upon river ice conditions. Throughout the drainage, most Chinook salmon harvested for subsistence use are dried, smoked, or frozen for later human consumption. Summer chum, fall chum and coho salmon harvested in the lower Yukon River are primarily utilized for human consumption and are also dried, smoked, or frozen for later use. In the upper Yukon River, summer chum, fall chum, and coho salmon are all an important human food source, but a larger portion of the harvest is fed to dogs used for recreation and transportation (Andersen 1992).

[7] The project was operated by the Yukon Delta Fisheries Development Association after ADF&G ceased operations on August 29.

Documentation of the subsistence salmon harvest is necessary to determine if sufficient salmon are returning to the Yukon Area and enough fishing opportunities are being provided to meet subsistence needs. In years with fishery restrictions, estimates of harvest can be used to assess the effect of the management actions taken to meet escapement goals for future salmon production. The primary method of estimating subsistence harvest is voluntary participation in the annual subsistence salmon harvest survey program conducted by ADF&G, Division of Commercial Fisheries. The survey is conducted in 33 communities (including the 2 coastal communities of Hooper and Scammon Bay) during the fall, after most households have completed fishing for salmon (Jallen et al. 2015). Additional information on harvest timing is obtained from harvest calendars that are sent to households and filled out voluntarily (Jallen et al. 2015).

Commonly cited reasons for reduced harvest included: low Chinook salmon abundance, fishing periods were closed or too short, households did not fish or were conserving Chinook salmon by not harvesting what they usually get, and that households did not have the right size of gillnet or other fishing equipment. Several fishermen reported they were unable to fish because they did not have newly allowed and less efficient gear types (dip nets, beach seines); or did not have gear to meet 6 inch mesh restrictions that were implemented for most districts. Closures during the summer season also impacted households' ability to harvest summer chum salmon that migrate concurrently with Chinook salmon. Surveyed households mentioned other factors that contributed to reduced salmon harvest, including, poor run dynamics, fuel and equipment expenses, river and weather conditions, health issues, or other personal reasons.

In portions of the upper Yukon River and Tanana River drainages that are road accessible, fishermen are required to obtain a household subsistence fishing permit. Harvests reported on subsistence fishing permits are added to the survey estimates to obtain the total number of salmon harvested in the drainage. The total estimated subsistence harvest of each species also includes salmon harvested from test fishery projects and distributed to residents of communities near the projects or retained from commercial catches.

The following summary presents preliminary results as of the publication date of this report. Final results will be included in an ADF&G Fishery Data Series publication after more thorough review. For the purposes of this report, results from the Coastal District communities of Hooper Bay and Scammon Bay are not included, as their harvest is considered part of the larger Yukon Area, but not specifically attributed to Yukon River origin stocks. In 2015, an estimated total of 2,382 households was present in the Yukon River in 31 communities. Of these, an estimated 1,013 households fished for salmon. Subsistence fishing permits were issued to 352 households in portions of the Yukon River drainage where permits are required and approximately 82% of the subsistence permits had been returned (at the time of this publication), and 158 of the permitted households reported fishing for salmon and other non-salmon fish species. Based on survey and permit data, the preliminary 2015 subsistence salmon harvest in the Alaska portion of the Yukon River drainage was estimated to be 6,640 Chinook; 62,803 summer chum; 86,143 fall chum; and 17,914 coho salmon (Appendices B2–B5). For comparison, recent 5-year average (2010–2014) subsistence salmon harvest estimates are 25,099 Chinook; 81,398 summer chum; 89,022 fall chum; and 15,634 coho salmon (Appendices B2–B5) from communities in the Alaska portion of the Yukon River drainage. The preliminary harvest estimates of Chinook, chum (both summer and fall), and coho salmon were below amounts necessary for subsistence levels.

4.2 COMMERCIAL FISHERY

Summer Season Harvest

During the 2015 summer season there were a total of 54 commercial periods in the Lower Yukon Area and 8 commercial periods in the Upper Yukon Area. The total commercial harvest for the summer season in the Alaska portion of the Yukon River drainage was 358,856 summer chum salmon (Appendix A3), the third largest harvest since 2004. The commercial harvests of summer chum salmon in the Lower and Upper Yukon Areas were 354,086 and 4,770 fish, respectively. The total summer chum salmon commercial harvest for the entire Yukon Area was approximately 3% below the 2010–2014 average harvest of 368,771 fish (Appendix B3).

Approximately 227,200 summer chum salmon were harvested during selective gear (dip net and beach seine) periods in the Lower Yukon Area. Selective gear harvest accounted for more than half of the total commercial summer chum salmon harvest in the Lower Yukon Area. Dip nets accounted for nearly all (95.8%) of the summer chum salmon harvest taken with selective gear types. Approximately 126,900 summer chum salmon were harvested in the Districts 1 and 2 restricted gillnet commercial fishery (6 inch or less mesh).

A total of 437 individual permit holders participated in the summer chum salmon fishery, of which 435 permit holders participated in Districts 1 and 2, and 2 permit holders participated in District 6 (Tanana River) commercial periods (Appendix A4).

The sale of incidentally caught Chinook salmon was prohibited by emergency order during the entire commercial fishing season. In the Lower Yukon Area commercial fishery, approximately 9,500 Chinook salmon were reported as caught and released, and 347 Chinook salmon were reported as caught and released in the District 6 commercial summer chum salmon fishery. A total of 3,372 Chinook salmon were retained for subsistence purposes during summer season in the commercial fisheries. Approximately 99 Chinook salmon were retained for subsistence purposes during the fall season commercial fishery.

Summer Season Commercial Harvest Characteristics

From the incidental catch of Chinook salmon during summer chum salmon-directed commercial gillnet openings, 80 Chinook salmon were sampled opportunistically for ASL characteristics. Of these, 67 Chinook salmon were aged, and 49% were age-4, 18% were age-5, and 33% were age-6. Females comprised 32% of the sample. Given the small sample size and selective gear sizes, these age and sex compositions may not be representative of the entire Chinook salmon run.

Additionally, over 500 Chinook salmon were sampled from set gillnet (n = 239) and fish wheel (n = 272) subsistence fisheries in the Upper Yukon Area. Of the 211 Chinook salmon aged from fish wheel catches, 66% were age-4, 23% were age-5, and 10% were age-6. Females comprised 24% of the sample. Of the 190 Chinook salmon aged from set gillnet catches, 1% were age-3, 44% were age-4, 25% were age-5, 30% were age-6, and 1% were age-7. Females comprised 28% of the sample.

Approximately 1,600 summer chum salmon were sampled for ASL from commercial harvests in Districts 1 and 6. The summer chum salmon age composition from the District 1 dip net commercial fishery (n = 712) was 1% age-3, 34% age-4, 63% age-5, and 2% age-6 fish. Females comprised 47% of the sample. The summer chum salmon age composition from the District 1 gillnet commercial fishery (n = 396) was 2% age-3, 54% age-4, 43% age-5, and 2% age-6 fish.

Females comprised 43% of the sample. Summer chum salmon age compositions from the District 6 commercial fish wheel harvest are not available at this time. Approximately 480 summer chum salmon were sampled in District 6 and females comprised 53% of the sample. The mean length of all summer chum salmon sampled in Districts 1 and 6 commercial fisheries was 551 and 586 mm.

Fall Season Harvest

There were a total of 44 commercial periods during the fall season in 2015. The majority of the fall season commercial harvest occurred in the Lower Yukon Area. A regular schedule of commercial fishing periods was established in Districts 5 and 6, but as a result of limited markets, fishing effort was low and harvests were relatively small. The total commercial harvest for the Yukon River fall season in the Alaska portion of the drainage was 191,470 fall chum and 129,700 coho salmon (Appendix A3). The commercial harvest of fall chum salmon was above the most recent 5-year (2010–2014) average of 176,973 fish and was also greater than the 10-year (2005–2014) average of 147,547 fish (Appendix B4). The coho salmon harvest was the highest on record, eclipsing the previous high of 106,686 fish in 1991 (Appendix B5). The average weight of fall chum salmon caught commercially in Districts 1 and 2 was 7.3 lbs, the average weight of coho salmon was also 7.3 lbs. All salmon were sold in the round and no salmon roe was sold separately.

Fall Season Commercial Harvest Characteristics

Fall chum salmon age composition from the District 1 commercial harvest was 7% for age-3 and 2% for age-6, and the dominant age classes contained 52.9% age-4 and 38.1% age-5, estimated from a sample of 750 fish. Females comprised 49.5% of the commercial harvest sample of fall chum salmon. The mean length of fall chum salmon in the commercial harvest sample was 568 mm.

Preliminary coho salmon sex composition from the commercial harvest in District 1 (n = 299) contained 54.2% females, which was above the recent 10-year average (2005–2014) of 48.3%. The mean length of coho salmon in the commercial harvest sample was 570 mm. The ages were not completed for either commercial or LYTF sampling at the time of this publication.

4.3 SPORT FISHERY

Sport fishing effort for wild salmon in the Yukon River drainage is directed primarily at Chinook and coho salmon, with little effort directed at chum salmon. All chum salmon harvested in the sport fishery are categorized as summer chum salmon because these fish are mostly caught incidental to Chinook salmon during mid-summer in clearwater tributaries. Some harvest of fall chum salmon entering clearwater tributaries after Chinook salmon spawning occurs but is considered negligible relative to summer chum salmon harvests.

Alaska sport fishing effort and harvests are monitored annually through a statewide sport fishery postal survey. Harvest estimates are not available until approximately one calendar year after the fishing season; therefore, 2015 estimates were not available for this report. Total sport harvest of salmon during 2014 in the Alaska portion of the Yukon River drainage (including the Tanana River) was estimated to be 0 Chinook, 374 summer chum, and 1,855 coho salmon (Appendices B2, B3, and B5). The recent 5-year (2010–2014) average Yukon River drainage sport salmon harvest was estimated to be 292 Chinook, 709 summer chum, and 732 coho salmon (Appendices B2, B3, and B5).

Most of sport fishing effort for the Yukon River occurs in the Tanana River drainage along the road system. From 2010 to 2014, harvests in the Tanana River represented, on average, 56%, 8% and 30% of the total Yukon River drainage Chinook, summer chum, and coho salmon sport fish harvest[8], respectively. In the Tanana River, most Chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika rivers, whereas most coho salmon are harvested from the Delta Clearwater and Nenana river systems. In the Yukon River drainage, excluding the Tanana River, most sport fishing effort for salmon takes place in the Anvik and Andreafsky rivers.

Since 2005, all freshwater sport fishing guides and guide businesses operating in Alaska have been required to be licensed. In addition, sport fishing guides and businesses are required to report sport fish harvest and fish released in logbooks. From 2010 to 2014, guided sport harvests in the Yukon River drainage (excluding the Tanana River drainage) averaged 80 Chinook and 229 coho salmon.

In 2015, an emergency order was issued on May 5 closing all waters of the U.S. portion of the Yukon River drainage, excluding the Tanana River drainage, to sport fishing for Chinook salmon for the 2015 season, effective May 11. On June 16, an emergency order was issued effective 12:01 a.m. on June 19 that closed all waters of the Tanana River drainage to sport fishing for Chinook salmon, well before their arrival into the clearwater sport fisheries such as the Chena and Salcha rivers.

4.4 PERSONAL USE FISHERY

The Fairbanks Nonsubsistence Area, located in the middle portion of the Tanana River, contains the only personal use fishery within the Yukon River drainage. Subsistence or personal use permits have been required in this portion of the drainage since 1973. Personal use fishing regulations were in effect from 1988 until July 1990, and from 1992 until April 1994. In 1995, the Joint Board of Fisheries and Game reestablished the Fairbanks Nonsubsistence Area, and it has been managed consistently under personal use regulations since then. Historical harvest data must account for these changes in status.

Subdistrict 6-C is completely within the Fairbanks Nonsubsistence Area and therefore falls under personal use fishing regulations. Personal use salmon or whitefish/sucker permits and a valid resident sport fishing license are required to fish within the Fairbanks Nonsubsistence Area. The harvest limit for a personal use salmon household permit is 10 Chinook, 75 summer chum, and 75 fall chum and coho salmon combined. The personal use salmon fishery in Subdistrict 6-C also has a harvest limit of 750 Chinook, 5,000 summer chum, and 5,200 fall chum and coho salmon combined.

In 2015, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods and was closed from 12:00 p.m. Wednesday, June 17 until 6:00 p.m. Friday, July 17 to conserve Chinook salmon. A total of 42 personal use salmon and 22 personal use whitefish and sucker household permits were issued. The 2015 preliminary harvest results based on 94% of the personal use household permits returned in Subdistrict 6-C included 5 Chinook, 220 summer chum, 80 fall chum, and 145 coho salmon. The recent 5-year (2010–2014) average personal use

[8] Alaska Sport Fishing Survey database [Intranet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited March 16, 2015). Available from: https://intra.sf.adfg.state.ak.us/swhs_est/

harvest was 73 Chinook, 289 summer chum, 927 fall chum, and 336 coho salmon (Appendices B2–B5) in the Yukon Area.

5.0 CANADIAN MANAGEMENT OVERVIEW

5.1 CHINOOK SALMON

The total run of Canadian-origin mainstem Yukon River Chinook salmon in 2015 was expected to be poor to below average, with a preseason outlook range of 59,000 to 70,000 Chinook salmon. As noted previously, the escapement goal (IMEG) range recommended by the Yukon River Panel was 42,500 to 55,000 Chinook salmon.

Each year, in advance of the salmon season, DFO develops an Integrated Fisheries Management Plan (IFMP) for Yukon River Chinook and fall chum salmon. The IFMP identifies the main objectives and requirements for the Canadian Yukon River salmon fishery, as well as the management measures that will be used to achieve these objectives.[9]

Canadian management decisions were based on the application of inseason assessment information to the management decision matrix, a component of the IFMP. The decision matrix provides detailed guidance for the management of fisheries linked to specific inseason run abundance levels. The 2015 decision matrix summarized the management reference points, general allocation plans, and anticipated management responses under different run size scenarios (Table 2).

The following decision thresholds were used to guide management actions to achieve an escapement goal range of 42,500 to 55,000 fish and a management target of 48,750 Canadian-origin Chinook salmon.

i. Green Zone: The commercial and domestic fisheries would not open unless it was expected that the border escapement would be greater than 55,000 Chinook salmon based on the mainstem sonar program located near Eagle, Alaska. The recreational fishery default regulation is that it is open until closed; therefore, the recreational fishery would be closed at a run size of 55,000 or fewer. A border escapement larger than 55,000 fish would be sufficient to allow for an unrestricted First Nation fishery.
ii. Yellow Zone: Consideration would be given to restricting First Nation fisheries if the run size to the border was in the 42,500 to 55,000 range. It is important to note that opportunities for a limited harvest in this range would be subject to international harvest sharing provisions.
iii. Red Zone: Closures in First Nation fisheries would be expected if the run projection was 42,500 or fewer fish.

Prior to the season, meetings were held between the Yukon Salmon Sub-Committee (YSSC), DFO, Yukon First Nation Governments, Renewable Resources Councils (RRCs), and the general public to discuss the 2015 forecast and possible management scenarios. The poor preseason forecast, coupled with the failure to achieve minimum escapement targets in 5 of the past 8 years, resulted in continued concern over the long-term health of Canadian-origin Yukon River Chinook salmon stocks. At the recommendation of the YSSC, the inseason fishery management decision matrix for Yukon River Chinook salmon in Canada was revised to reflect the escapement goal range defined by the Yukon River Panel (YRP) pursuant to the Yukon River

[9] The IFMP is available online at http://www.dfo-mpo.gc.ca/Library/358169.pdf.

Salmon Agreement (YRSA). In addition, to improve the likelihood of achieving conservation objectives, a midpoint management target of 48,750 was used to guide inseason management decisions.

Based on the preseason outlook, it was uncertain that the lower end of the escapement goal (42,500 Canadian-origin Chinook salmon) would be achieved. As a result of recommendations brought forth by the YSSC, the total allowable catch (TAC) of Chinook salmon in commercial, domestic, and recreational fisheries was varied to zero at the beginning of the season. In addition, the TAC for First Nations was removed for conservation purposes until run strength of Canadian-origin Chinook salmon could be determined with reasonable confidence through inseason stock assessment programs, particularly the mainstem sonar program located near Eagle.

Table 2.–Inseason fishery management decision matrix for mainstem Yukon River Chinook salmon in Canada, 2015.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	<42,500	FN	0	Removal of allocation for conservation purposes
		RF	0	Closed – Directed salmon fishing prohibited
		CF	0	Closed
		DF	0	Closed
YELLOW ZONE	42,500–55,000 **Management Target 48,750*	FN	0 to 8,000	Catch target to vary with abundance within zone: limited harvest below 48,750; up to 8,000 catch at run of 55,000. Catch is subject to international harvest sharing provisions
		RF	0	Closed – No retention permitted
		CF	0	Closed
		DF	0	Closed
GREEN ZONE	>55,000	FN	Variable	Unrestricted
		RF	100 – 500	Allocation (harvest opportunities) subject to international harvest sharing provisions
		CF	Variable	
		DF	100–300	

Legend: FN = First Nation fishery; CF = commercial fishery; RF = recreational fishery; DF = domestic fishery.

Inseason Management Yukon River Mainstem Chinook Salmon

Early in the 2015 season, information from the ADF&G LYTF project near Emmonak and the mainstem sonar project near Pilot Station in the Lower Yukon Area, suggested that the Canadian-origin Chinook salmon run to the Upper Yukon River would likely be toward the low end of the preseason outlook range of 59,000 to 70,000 Chinook salmon. Throughout the early to mid-portion of the run, the TAC remained at zero and no harvest was permitted in any of the fisheries, including the First Nation fishery. The DFO and YSSC held regular teleconferences with First Nation managers to update them on run projection scenarios.

Border passage projections in the latter part of the run indicated that the escapement of Canadian–origin Chinook salmon was projected to meet or exceed the upper end of the escapement goal range of 42,500 to 55,000 fish. Despite the improvement in the return and an available TAC of Chinook salmon, a number of Yukon First Nations chose not to fish. Several communities purchased sockeye and coho salmon from the Taku River and Skeena River commercial fisheries. A limited harvest was undertaken in 3 communities, largely for

ceremonial/cultural purposes; not all catch information was available at the time of writing this report, but the total harvest of Chinook salmon in these areas did not likely exceed 1,000 fish in 2015.

In the recreational fishery, the daily catch and possession limits in the recreational fishery were reduced to zero, effective June 28. On July 3, continued low border escapement projections and the removal of a TAC in the First Nation fishery triggered the closure of the Yukon River in the vicinity of the Tatchun River to all angling to allow unimpeded passage of Chinook salmon through this popular fishing site. Given the limited opportunity provided to First Nation subsistence fisheries and conservative management actions undertaken in U.S. fisheries, Chinook salmon commercial and domestic fisheries in Canada remained closed throughout the 2015 season.

Inseason Management Porcupine River Chinook Salmon

In the absence of stock specific information on Porcupine River Chinook salmon in Canada, Canadian management of this stock is based on information and management of mainstem Yukon River Chinook salmon. Given the poor outlook for mainstem Chinook salmon in 2015, it was recommended that Porcupine River subsistence fishing activities occur in areas where Chinook salmon were less likely to be caught, and that gillnets used in subsistence fisheries have a mesh size of 6 inches or less. It was also recommended that, where possible, both female and large Chinook salmon incidentally caught in subsistence gillnets would be released if it were likely that the fish would survive. Chinook salmon that were incidentally caught and not returned to the water could be retained for subsistence purposes.

5.2 Fall Chum Salmon

Mainstem Yukon River

The 2015 preseason forecast for the Canadian-origin fall chum salmon run to the mainstem Yukon River was expected to be an average to above average run with a range of 236,000 to 294,000 fish. As noted previously, the escapement goal (IMEG) range recommended by the Yukon River Panel was 70,000 to 140,000 Canadian-origin fall chum salmon.

Canadian management decisions were based on the application of inseason assessment information to the management decision matrix – a component of the IFMP. The decision matrix provides detailed guidance for the management of fisheries linked to specific inseason run abundance levels. The 2015 decision matrix summarized the management reference points, general allocation plans, and anticipated management responses under different run size scenarios (Table 3).

The following decision thresholds were used to guide management actions to achieve an escapement goal range of 70,000 to 104,000 Canadian-origin chum salmon.

i. Green Zone: at run size projections greater than 73,000 fall chum salmon, First Nation fisheries would be unrestricted and harvest opportunities within the commercial, domestic, and recreational fisheries would be considered depending on run abundance and international harvest sharing provisions.
ii. Yellow Zone: at run projections within a range of 40,000–73,000, commercial, domestic and recreational fisheries would be closed and the First Nation fishery would likely be

reduced with restrictions increasingly more severe the closer the run projection was to the lower end of the Yellow Zone.

iii. The Red Zone: at run projections of less than 40,000 fall chum salmon closures in all fisheries could be expected.

Table 3.–Inseason fishery management decision matrix for mainstem Yukon River fall chum salmon in Canada, 2015.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	<40,000	FN	0	Closures considered.
		CF	0	Closed.
		RF	0	Closed, i.e. chum salmon quota varied to zero.
		DF	0	Closed.
YELLOW ZONE	40,000–73,000	FN	0 to 3,000	Catch target to vary with abundance within zone.
		CF	0	Closed.
		RF	0	Closed, i.e. chum salmon quota varied to zero.
		DF	0	Closed.
GREEN ZONE	>73,000	FN	3,000+	Unrestricted.
		CF	Variable	Catch target to vary with abundance and be consistent with International agreement on harvest shares.
		RF	0	Fishing opportunity provided, no catch anticipated.
		DF	0	Fishing opportunity provided, no catch anticipated.

Note: Legend: FN = First Nation fishery; CF = commercial fishery; RF = recreational fishery; DF = domestic fishery.

Inseason Management Mainstem Yukon Fall Chum Salmon

Inseason decisions on fishery openings and closures in Canada for fall chum salmon were made in a similar way to those for Chinook salmon. There is uncertainty associated with early inseason projections of fall chum salmon because of the unpredictable size, timing, and destination of the individual pulses. In 2015, early inseason information from the lower Yukon River suggested that border escapement would be strong enough to support a normal aboriginal harvest and to provide opportunities in the commercial fishery. Inseason projections of the Canadian component of the fall chum salmon run were first based on run estimates and genetic apportionment of Canadian-origin fall chum from the mainstem sonar project near Pilot Station and assessment information from the LYTF. As the fish moved upriver, run timing was normally confirmed by the fish wheel project operated at Rampart Rapids. As the fish approached and entered Canada, estimates from the mainstem Yukon River sonar near Eagle provided robust projections.

As per the decision matrix, a border escapement projection of greater than 73,000 fish was required before commercial fishing opportunities were allowed. Since it was anticipated, based on harvest in recent years, that the Alaska subsistence fishery upstream of the sonar site near Eagle would take about 15,000 fall chum salmon, a projection greater than 88,000 fish at the sonar site was required to meet the border escapement objective.

The intention of management actions in 2015 was to ensure that the IMEG range of 70,000–104,000 fall chum salmon was achieved. By late-August, it was evident that the fall chum salmon run was at or above the upper end of the preseason forecast based on projections from the LYTF, the mainstem sonar operated near Pilot Station, and the fish wheel operated at Rampart Rapids. The commercial and domestic fisheries opened on August 28 for 5 days to provide opportunities for the catch and sale of early run fall chum salmon, which are considered to be marketable as food for human consumption. In this initial opening, fishing was restricted to areas below the confluence of the Yukon River and Coffee Creek in order to protect migrating and spawning Chinook salmon in upstream areas. When the Eagle sonar estimates provided further confidence in projections, the commercial and domestic fisheries opened in all areas defined in regulation on September 4 and remained open until October 21. The total 2015 commercial and domestic fall chum salmon harvest was 2,862 and 35 fish, respectively (Appendix A6).

Fishing Branch (Porcupine River)

The 2015 preseason forecast estimate for Porcupine River chum salmon (at Fishing Branch River) was 14,000–26,000 fish (midpoint 18,000 fish). The current IMEG for the Fishing Branch River established by the Yukon River Panel is 22,000–49,000 adult chum salmon. In previous years, a decision matrix was developed to allow a minimal harvest to occur in years of low abundance. However, considering that the minimum spawning escapement of chum salmon Fishing Branch River had not been achieved in 3 of the past 6 years, and only the very low end of the escapement goal range was achieved in 2 of the past 6 years, a very conservative approach was warranted.

Following discussion with Vuntut Gwitchin First Nation, the North Yukon Renewable Resource Council, and the YSSC, it was recommended that no directed chum salmon fishery occur in the Porcupine River until such a time that an inseason projection of greater than 22,000 to the Fishing Branch River could be determined.

Prior to the start of the season, the total allowable catch of chum salmon allocated to Vuntut Gwitchin First Nation subsistence fisheries in 2015 was removed for conservation purposes**.**

Inseason Management Porcupine River Fall Chum Salmon

Canadian fishery management considered early season information from the sonar project near Pilot Station. Estimates of fall chum salmon passage in combination with genetic mixed stock analysis (MSA) can provide an estimate of the return of Fishing Branch chum salmon. However, the Fishing Branch River component at Pilot Station is such a small part of the total run that the uncertainty associated with these estimates is very high. It is difficult to base management decision on this information.

In 2015, the Old Crow-based Porcupine River sonar provided an estimate of the return of chum salmon to the Canadian portion of the Porcupine River. Escapement to the Fishing Branch River was monitored by a counting weir (reinstalled in 2015 after a hiatus in 2013 and 2014).

Throughout the season, the Porcupine River sonar indicated that the lower end of the escapement goal would likely not be achieved and the TAC remained at zero. An expanded sonar estimate of fall chum salmon passage at the Porcupine River sonar was 21,397 fish. Of these, 556 fall chum salmon were harvested upstream of the sonar site. The Fishing Branch weir count of 8,351 fell below the lower end of the IMEG range of 22,000–49,000 fish.

6.0 CANADIAN HARVEST SUMMARIES

6.1 FIRST NATION FISHERIES

Catch estimates of salmon in the aboriginal fisheries on the Yukon and Porcupine rivers are determined from locally conducted inseason and postseason interviews using a catch calendar and a voluntary recording system.

Mainstem Yukon River Chinook Salmon

Based on a preseason outlook for a below average run of 59,000–70,000 Canadian-origin Yukon Chinook salmon, the YSSC recommended that the TAC be varied to zero early in the 2015 fishing season. Although a TAC was available later in the season, Yukon First Nation Governments continued to follow very conservative management plans resulting in severely reduced or, in many communities, zero harvest for 2015. The Upper Yukon River aboriginal Chinook salmon catch was estimated to be 1,000 fish.

Mainstem Yukon River Fall Chum Salmon

The preseason outlook for Canadian-origin fall chum salmon in 2015 indicated an average to above average run of 236,000–294,000 fish. The border passage estimate at this run projection would place Canadian management in the green zone and therefore no restrictions were expected in the First Nation fisheries. As inseason information became available, the First Nation fisheries proceeded without restrictions. The preliminary 2015 fall chum salmon harvest in the aboriginal fishery from the upper Yukon River was estimated to be 1,000 fish based on recent harvest information (Appendices A6 and B8).

Porcupine River Chinook, Fall Chum, and Coho Salmon

Vuntut Gwitchin First Nation (VGFN) reported a season total harvest of 204 Chinook salmon for 2015 (Appendix A6). The recent 10-year average (2005–2014) was 277 Chinook salmon (Appendix B7).

A total of 556 fall chum salmon was harvested in the Old Crow-based VGFN fishery (Appendix A6), which was 81% below the recent 10-year average harvest from 2005 to 2014 of 2,992 chum salmon (Appendix B8). Approximately 75% of the retained catch was reported to be male.

There were no coho salmon harvested on the Porcupine River in 2015, compared to the 2005–2014 average of 150 fish. VGFN managers noted that citizens were unable to harvest coho salmon in 2015 due to unstable ice conditions on the Porcupine River during October and November.

6.2 COMMERCIAL FISHERY

Chinook Salmon Harvest

The commercial Chinook salmon fishery remained closed throughout the 2015 Chinook salmon season and there was no harvest.

Fall Chum Salmon Harvest

A strong return of fall chum salmon resulted in opportunities for commercial fishery openings throughout the fall season. A total of 2,862 fall chum salmon were harvested during commercial fishery openings (Appendix A6). Since 1997, there has been a marked decrease in commercial catches of Upper Yukon River fall chum salmon as a result of a limited market. The total 2015 commercial fall chum salmon catch of 2,862 fish was 36% below the 2005–2014 average of 4,405 fish and 15% below the 2010–2014 average of 3,311 fish (Appendix B8). Between 2005 and 2014, the commercial fall chum salmon catch ranged from a low of 293 fish in 2009, when the run was late and the fishery was closed most of season due to conservation concerns, to a high of 11,931 fish in 2005.

Commercial harvest of coho salmon in the mainstem Yukon River in Canada is usually very small. This is thought to be related to a combination of low abundance and limited availability of this species to fisheries due to late migration timing. There were no coho salmon harvested in the commercial fishery in 2015.

6.3 DOMESTIC FISHERY

The domestic fishery was closed during the Chinook salmon season. For fall chum, there were 2 openings (concurrently to the commercial fishery openings) during the season. There was a total reported domestic catch of 35 fall chum salmon in 2015 (Appendices A6 and B8). This compares to a long term average of 464 fish, from 1974 to 2014; domestic fishery catches were not recorded prior to 1974 (Appendices B7 and B8).

6.4 RECREATIONAL FISHERY

In 1999, the Salmon Sub-Committee introduced a mandatory Yukon Salmon Conservation Catch Card (YSCCC) to improve harvest estimates and to serve as a statistical base to ascertain the importance of salmon to the Yukon River recreational fishery. Anglers are required to report their catch and harvest by late fall. The information reported includes the number, species, fate (kept or released), sex, size, date, and location of all salmon caught.

From catch card information received as of this publication, no Chinook salmon were caught and no Chinook salmon were harvested in the Yukon River or its tributaries in the 2015 recreational fishery. The average number of Chinook salmon catch retained annually within the 2005–2014 period was 202 fish (Appendix B7). For the 2015 season, the daily catch and possession limits of fall chum salmon in the recreational fishery remained at 2 and 4, respectively. There were no reports of fall chum salmon caught.

7.0 TOTAL RUN AND ESCAPEMENT ASSESSMENTS FOR 2015

7.1 CHINOOK SALMON DRAINAGEWIDE

Total 2015 Chinook salmon passage at the mainstem Yukon River sonar project near Pilot Station was approximately 116,000 fish[10] (Appendix A2). This is considered an index of drainagewide Chinook salmon run, rather than a total run size estimate, since some salmon are harvested or enter spawning areas below this sonar site. Total Chinook salmon passage at the mainstem Yukon River sonar near Eagle in 2015 was 84,015 fish. After subtracting estimated U.S. subsistence harvest taken above the Eagle sonar site (341 fish) and the estimated Canadian harvest of Chinook salmon (1,000 fish), the estimated escapement in Canada was 82,674 Chinook salmon (Appendix B11). This escapement was above the upper end of the IMEG of 42,500–55,000 fish and also above the upper end of preseason outlook (59,000–70,000 fish; Appendix D2). Preliminary harvest estimates indicate that about 3,700 Canadian-origin Chinook salmon were harvested in U.S. fisheries. Combining the spawning escapement estimate with the U.S. harvest of Canadian-origin Chinook salmon and Canadian harvest indicates the total Canadian-origin run size was approximately 87,400 Chinook salmon (Appendices B11 and D2).

Age, sex, and size composition was assessed at both mainstem sonar sites and in various escapement projects. Age and sex composition of the run shifted towards higher proportions of older age classes and females between Pilot Station and Eagle sites (Table 4; Appendix A10).

Table 4.–Yukon River Chinook salmon age and female percentages from selected mainstem Yukon River assessment projects, 2015.

	Chinook salmon age or sex composition (percentage of samples)			
	Mainstem sonar near Pilot Station		Mainstem sonar near Eagle	
Age/Gender	historical average [a]	2015	historical average [a]	2015
4-year-old	9.1	22.4	6.8	10.8
5-year-old	50.1	33.9	42.4	34.4
6-year-old	38.2	43.2	47.5	52.3
female	35.8	36.1	42	42.1

[a] The average includes years from 2005 to 2014.

Escapement in U.S. tributaries was assessed at 3 weirs, 2 counting towers, and one sonar project, and 3 aerial surveys (Table 5). Existing escapement goals for all U.S. tributary stocks were met or exceeded (Table 5; Appendices B9, B10, B11 and C9). Note that these stocks do not contribute to the border passage objective or Canadian escapement, but their performance relative to Canadian stock may provide a comparative indicator of production trends among different stock groups.

[10] Some estimates in this section have been rounded.

Table 5.–Summary of 2015 Chinook salmon escapement estimates in Alaska tributaries, in comparison with existing escapement goals.

Location	Assessment method	Escapement goal (type)	2015 Escapement
E. Fork Andreafsky	Weir	2,100–4,900 (SEG)	6,705
W. Fork Andreafsky	Aerial survey	640–1,600 (SEG)	1,356
Anvik (Drainagewide)	Aerial survey	1,100–1,700 (SEG)	2,616
Nulato (Forks Combined)	Aerial survey	940–1,900 (SEG)	1,564
Gisasa	Weir	none	1,319
Henshaw	Weir	none	2,391
Chena	Sonar	2,800–5,700 (BEG)	6,291[a]
Salcha	Tower	3,300–6,500 (BEG)	6,879 [b]
Goodpaster	Tower	none	2,000

Note: Sustainable escapement goal (SEG) and biological escapement goal (BEG).

[a] Preliminary estimate. Final estimate will reported by project operator in separate report. Estimate is based on DIDSON sonar counts and a mixture model to create estimates for days with missed counts.

[b] Preliminary estimate. Final estimate will reported by project operator in separate report. Estimate uses a binomial mixed-effects model to create passage estimates for the period of missed counts prior to start of tower operations on July 12.

Escapement of Chinook salmon to tributaries in Canada was assessed at the Teslin River, the Big Salmon River, the Whitehorse Rapids Fishway, Blind Creek (Pelly River), the Wolf River, the Nisultin River, and the Porcupine River. On the Teslin River, a sonar project counted 20,410 Chinook salmon (Brian Mercer, Metla Environmental Inc.; personal communication; Appendix B12). On the Big Salmon River, 10,071 Chinook salmon were counted (Brian Mercer, personal communication), significantly above the average count of 4,911 fish (2005 to 2014, Appendix B12). At the Whitehorse Rapids Fishway, 1,465 Chinook salmon were counted, 22% above the 2005–2014 average count of 1,198 fish (Appendix B12). The overall sex ratio was 30% female, and hatchery-produced fish accounted for 60% of the return. On Blind Creek, 964 Chinook salmon were counted. This count was 130% above the 2005 to 2014 average count of 420 and 74% above the average count for all years (Appendix B12). Thirty-five percent of the sampled fish were female (Jane Wilson, J. Wilson & Associates; personal communication). On August 18, 428 Chinook salmon were counted during an aerial survey of the Nisutlin River index area and 242 Chinook salmon were counted in a survey of the Wolf River index area. On the Porcupine River 4,851 Chinook salmon were counted, 37% more than the estimated passage in 2014 (Ben Snow, B.Sc., R.P.Bio., EDI; personal communication).

7.2 SUMMER CHUM SALMON ALASKA

Most tributaries producing summer chum salmon experienced average to above average escapement in 2015, with the exception of the Anvik and Salcha rivers which were below average (Appendices B13 and C11). The passage estimate at the East Fork Andreafsky River weir was above the SEG of greater than 40,000 fish. The Anvik River BEG of 350,000–750,000 fish was also achieved. Counts at the Gisasa River and Henshaw Creek weirs were above average (Table 6; Appendices B13 and C11). Chena and Salcha river assessment projects experienced some high water and flooding events, but preliminary passage estimates were above average for the Chena River and below average for the Salcha River. Because the postseason estimate for the Chena River uses DIDSON sonar counts and a mixture model to estimate days of missed passage, the Chena River estimates should be considered complete. The Salcha River passage is based on a tower count only and, because of missed days of operation, the summer chum estimate is considered incomplete (Appendix B13).

Table 6.–Summary of 2015 summer chum salmon escapement counts, in comparison with existing escapement goals.

Location	Assessment method	Escapement goal (type)	2015 Summer chum salmon escapement
E. Fork Andreafsky	Weir	>40,000 (SEG)	50,338
Anvik	Sonar	350,000–700,000 (BEG)	374,968
Gisasa	Weir	none	42,747
Henshaw	Weir	none	238,529
Chena	Tower	none	8,620 [a]
Salcha	Tower	none	12,812 [b]

Note: Sustainable escapement goal (SEG) and biological escapement goal (BEG).

[a] Final estimates use DIDSON sonar counts and a mixture model to create estimates for days with missed counts.

[b] Due to high water events during the season this estimate should be considered incomplete.

7.3 FALL CHUM SALMON DRAINAGEWIDE

The initial method of determining total fall chum salmon run size is based on the lower Yukon River mainstem sonar passage estimate plus a correction factor of 10% and the estimated inriver harvest of fall chum salmon downstream of the sonar site. Inseason the run size model primarily uses the commercial fishery, which is the largest harvest component below the sonar site, to produce overall projections of abundance used to manage the fishery. Estimates of run size using this method resulted in a range of 751,000 to 804,000 fall chum salmon in 2015.

Postseason a Bayesian state-space model was used to estimate drainagewide escapement (Fleischman and Borba 2009). The total drainagewide run size is then derived by adding the estimated total harvest (Alaska and Canada) to the estimate of drainagewide escapement. In 2015 this method resulted in a total drainagewide run size estimate of 843,452 fall chum salmon, which came in lower than the 2015 forecast of 944,000 to 1,176,000.

The drainagewide escapement estimate produced by the Bayesian state-space model was 562,000 fall chum salmon, which was within the escapement goal range (Table 7). The model utilized historical escapement data from the Toklat, Delta, Chandalar, Sheenjek, Fishing Branch and Canadian mainstem Yukon rivers, as well as mark–recapture estimates of abundance from the upper Tanana, Kantishna, and Rampart-Rapids projects, and estimates from the mainstem sonar near Pilot Station (Appendices B14 and B16). The model takes into account estimates from sub-drainages in the dataset. Individually the fall chum salmon escapements to Chandalar and Delta rivers both exceeded the upper end of the individual escapement goals (Table 7; Appendices B14, C12).

Table 7.–Summary of 2015 fall chum salmon escapement counts, in comparison with existing escapement goals.

Location	Assessment method	Escapement goal (type)	2015 Fall chum salmon escapement [a]
Drainagewide	Bayesian	300,000–600,000 (SEG)	562,000
Chandalar River	Sonar	74,000–152,000 (BEG)	164,000
Sheenjek River	none	50,000–104,000 (BEG)	–
Upper Tributary [b]	none	152,000–312,000 (BEG)	–
Tanana River	none	61,000–136,000 (BEG)	–
Delta River	Ground Survey	6,000–13,000 (BEG)	33,400

Note: Biological escapement goal (BEG) and sustainable escapement goal (SEG).

[a] Rounded numbers.

[b] Upper Yukon Tributary goal is Chandalar, Sheenjek and Fishing Branch rivers combined.

The estimate of U.S./Canada border passage for fall chum salmon includes the Eagle sonar estimate (112,136 fish) plus an expansion for fish passing after the project near Eagle closes down for the onset of winter. In 2015 the expanded estimate of passage at the sonar site near Eagle was 125,095 fall chum salmon (Appendix B16). The estimate further includes the removal of the preliminary U.S. subsistence harvest taken above the Eagle sonar site (12,540 fish) for a total border passage of 112,255 fall chum salmon. Then subtracting the preliminary Canadian harvest (3,897 fish; Appendix A6) the resulting escapement in Canada was estimated to be 108,658 fall chum salmon, which was above the upper end of the IMEG of 70,000–104,000 fish.

Based on the Bayesian method of determining overall run size, the Canadian-origin mainstem fall chum salmon represented approximately 18% of the drainagewide return, therefore a preliminary reconstruction of the 2015 mainstem run suggests a run size of approximately 152,000 fish. This reconstruction is below the preseason outlook range of 236,000 to 294,000 Canadian-origin mainstem Yukon River fall chum salmon. The 2015 preseason outlook range was based on the ADF&G drainagewide outlook range of 944,000 to 1,176,000 fall chum salmon and an assumption that Canadian-origin mainstem Yukon River fall chum salmon would constitute at least 25% of the drainagewide return. The Canadian-origin fall chum salmon forecast assumed a contribution of at least 25% of the drianagewide return.

The age-4 fall chum salmon returning in 2015 failed to meet replacement and resulted in a poorer than expected run. In 2015, the proportion by age class for fall chum salmon caught in the LYTF and used to represent the drainagewide run included age-3 (8%), age-4 (58.9%), age-5 (29.9%), and age-6 (<3%) fish. The age-4 component was lower than average, the age-5 component was average, and age-3 and age-6 components were higher than average when compared to LYTF weighted averages for years 1977–2014. Fall chum salmon ASL composition data collected in the Delta River included age-3 (16.3%), age-4 (55.6%), age-5 (25.6%), and age-6 (<3%) fish (Appendix A24). Samples were also collected for the escapement into Canada based on the Yukon River mainstem sonar test fishing project operated near Eagle and include age-3 (3.6%), age-4 (60.3%), age-5 (35.0%), and age-6 (<2%) fall chum salmon (Appendix A24).

Canadian-Origin Fall Chum Salmon Mainstem Yukon River

The 2015 preliminary fall chum salmon spawning escapement estimate, based on the mainstem Yukon River sonar near Eagle, is 108,658 fish (Table 8, Appendix B15).

Canadian-Origin Fall Chum Salmon Fishing Branch River

In 2015 the Porcupine River border sonar chum salmon project was operated for the fifth year immediately downstream of Old Crow. An estimated 21,397 chum salmon passed by the sonar, and an estimated 556 fish were harvested in the Old Crow fishery, resulting in a preliminary spawning escapement estimate of 20,841 fish in the upper Porcupine River escapement. (Details are presented in Section 8.2).

The DFO operated the Fishing Branch River weir in 2015 after a 2-year cessation of the project. Weir installation was delayed by 10 days due to high water. The weir count of 6,797 was expanded by 1,554 fish to include estimates for fish passage prior to and after weir operation, yielding a Fishing Branch escapement estimate of 8,351 chum salmon.

Table 8.–Summary of 2015 preliminary fall chum salmon escapement counts to Canada, in comparison with existing interim management escapement goals (IMEG).

Location	Assessment method	Escapement goal (type)	2015 Fall chum salmon escapement
Fishing Branch River	Weir Count (expanded)	22,000–49,000 (IMEG)	8,351
Yukon River Mainstem	Sonar and harvest	70,000–104,000 (IMEG)	108,658

8.0 PROJECT SUMMARIES

8.1 ALASKA

Mainstem Yukon River Sonar Project near Pilot Station

The goal of the mainstem Yukon River sonar project near Pilot Station is to estimate the daily upstream passage of Chinook, chum, and coho salmon. The project has been in operation since 1986. Both split-beam and Adaptive Resolution Imaging Sonar (ARIS) are used to estimate total fish passage, and CPUE from the drift gillnet test fishing portion of the project is used to estimate species composition (Lozori and McIntosh 2014).

Fish passage estimates at the mainstem Yukon River sonar project near Pilot Station are based on a sampling design involving systematic sonar counts of all fish species and drift gillnet sampling to determine species apportionment. The sonar equipment is operated daily in three 3-hour intervals and drift gillnets 25 fathoms long and approximately 4.3 fathoms in depth, with mesh sizes ranging from 7.0 to 21.6 cm (2.75 to 8.5 in), are fished twice each day between sonar periods. Species proportions from the drift gillnet samples are applied to the total sonar passage counts to apportion the counts to species.

During the 2015 season, sonar units on both banks were operational from May 31 through August 31. River breakup occurred on May 14 based on National Weather Service data[11]. An estimated 3,422,703 fish passed through the sonar sampling area between May 31 and August 31 (Table 9; Appendix A2). Test fishing began on May 28; the first Chinook salmon was caught on May 30; the first summer chum salmon was caught on May 31; and the first coho salmon was caught on July 23. Drift gillnetting resulted in a catch of 8,106 fish including 451 Chinook, 2,806 summer chum, 2,137 fall chum, and 695 coho salmon; a total of 2,018 fish of other species were also

[11] http://aprfc.arh.noaa.gov/php/brkup/breakupDb.php?riverOption_=Yukon&riverOption__=Yukon+River&riverOption___=Pilot+Station++%2826+yrs%29&riverOption=Yukon+-+Yukon+River+at+Pilot+Station+%28ID%3A488%29

caught. Chinook salmon were sampled for ASL, and genetic samples were taken from Chinook, chum, and coho salmon. Any captured fish that were not successfully released alive were distributed daily to nearby residents in Pilot Station.

The right bank bottom profiles remained similar to prior years with little or no change throughout the season. Left bank profiles remained linear throughout the field season and there were no problems with detection due to silt or other environmental factors. At the beginning of the summer season, water levels observed near Pilot Station were above average, but they dropped to below average in late June, and continued to be below average during the fall season, when compared to USGS 2001–2014 data[12].

In 2015, there were no operational problems at the site, the sonar ran for the intended season length and there were no missed sampling days. Daily passage estimates were provided to fisheries managers throughout the season and this information was disseminated weekly through multi-agency international teleconferences and data-sharing with stakeholders in areas from the lower Yukon River all the way to the spawning grounds in Canada.

Table 9.–Cumulative fish passage estimates by species with 90% confidence intervals (CI), at the mainstem Yukon River sonar project near Pilot Station in 2015.

		90% CI	
Species	Total passage	Lower	Upper
Large Chinook [a]	86,620	62,942	110,298
Small Chinook [b]	29,464	10,999	47,929
Summer chum	1,385,083	1,281,880	1,488,286
Fall chum	546,894	502,855	590,933
Coho	97,587	82,307	112,867
Pink	22,421	10,604	34,238
Other [c]	1,254,634	1,164,567	1,344,701
Total	3,422,703		

[a] Large Chinook salmon >655 mm

[b] Small Chinook salmon ≤655 mm

[c] Includes sockeye salmon, cisco, whitefish, sheefish, burbot, long nose sucker, Dolly Varden, and northern pike.

Yukon River Chinook Salmon Harvest Stock Identification

Chinook Salmon

Three region-of-origin groupings (also referred to as stock groups) have been identified for Chinook salmon within the Yukon River drainage. The Lower and Middle Yukon River stock groups spawn in Alaska and the Upper Yukon River stock group spawns in Canada. Scale pattern analysis, age composition estimates, and geographic distribution were used by ADF&G from 1981 through 2003 to estimate Chinook salmon stock composition in Yukon River harvests. From 2004 to present, genetic analysis of tissue samples has been the primary method for stock identification. Postseason stock proportion estimates were only available for the previous year (2014) at time of writing this report, but a sampling summary is provided for 2015.

[12] http://waterdata.usgs.gov/ak/nwis/uv?cb_00060=on&cb_00065=on&format=gif_stats&period=21&site_no=15565447

In 2014, tissue samples were collected from fish in mixed stock harvests in District 2 (from Pilot Station test fishery) and District 5 (from Fort Yukon subsistence fishermen). U.S. and Canada combined harvest estimates for 2014 were 25.4% Lower stock group, 27.8% Middle stock group, and 46.8% Upper stock group (Appendix A12). U.S.-only harvest estimates from the Lower, Middle, and Upper stock groups were 26.3%, 28.8%, and 44.8%, respectively (Appendix A13). U.S. and Canadian shares of the Upper stock group harvest were 92.2% and 7.8%, respectively (Appendix A14). Comparing U.S. and Canada combined harvest estimates for 2014 with the 2009–2013 5-year average, the Lower stock group was above average, the Middle stock group was near average, and the Upper stock group was below average (Appendix A12). Comparing U.S. and Canadian shares of the Upper stock group harvest for 2014 with the 2009–2013 5-year average, the U.S. harvest estimate was above average and the Canadian harvest estimate was below average (Appendix A14). Genetic stock estimates for Chinook salmon sampled in the Pilot Station test fishery (but not directly applied to the harvest) are available for 2014 and 2015[13].

In 2015, ADF&G field crews, along with other collaborators, collected 2,602 samples (axillary process tissue preserved in ethanol) from Chinook salmon harvested by test and subsistence fisheries in 2015. These samples were from mixed stock fisheries in the mainstem Yukon River in Districts 1, 2, 4, and 5. Samples collected from test fisheries totaled 2,072 fish, and included 596 from LYTF, 443 from the mainstem Yukon River sonar project operated near Pilot Station, and 1,033 from the mainstem Yukon River sonar operated near Eagle. Samples collected from subsistence fisheries totaled 530 fish, and included 51 from Galena and Ruby in District 4 and the remainder were from Fort Yukon in District 5. Subsistence harvest samples were collected by Spearfish Research, which contracted with individual fishermen to sample their harvest. The results from the 2015 sampling effort will not be available by time of publication of this report.

In Canada, a total of 314 baseline samples were collected; including 22 from 100 Mile River, 3 from Hoole River, 2 from Lapie River, 21 from Nisling River, 55 from Nisutlin River, 3 each from Pelly Lakes outlet and Prevost River, 59 from Ross River, 1 from South Macmillan River, 111 from Whitehorse Rapids fishway, and 34 from Wolf River. These samples were collected by collaborators in Canada and shared with the Gene Conservation Laboratory, ADF&G, Anchorage.

Chum Salmon

In 2015, ADF&G, in cooperation with USFWS, collected genetic tissue samples from 4,939 chum salmon (2,806 during summer season and 2,133 during fall season based on the transition date of July 18) during the test fishery associated with the mainstem Yukon River sonar project operated near Pilot Station. Chum salmon genetic samples reside in the Conservation Genetics Laboratory, USFWS, Anchorage, Alaska. Populations in the baseline are reported in aggregated stock groups (Table 10).

[13] http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.yukonchinook_results accessed January 2016.

Table 10.–Microsatellite baseline is comprised of 37 stocks used to estimate stock composition of chum salmon collected at the mainstem Yukon River sonar test drift gillnet program near Pilot Station in 2015.

Stock Aggregate Name	Populations in Baseline
Lower	Andreafsky, Anvik, California, Chulinak, Clear, Dakli, Kaltag, Nulato, Gisasa, Melozitna, Rodo, Tolstoi
Upper Koyukuk+Main	Henshaw, Jim, South Fork Koyukuk (early and late run), Tozitna
Tanana Summer	Chena, Salcha
Tanana Fall	Bluff Cabin, Delta, Nenana, Kantishna, Toklat, Tanana mainstem
Border U.S.	Big Salt, Chandalar, Sheenjek, Black
Porcupine	Fishing Branch
Mainstem	Big Creek, Minto, Pelly, Tatchun
White	Donjek, Kluane
Teslin	Teslin
Aggregate Name	**Aggregate within Aggregate**
Summer	Lower, Middle
Middle	Upper Koyukuk+Main, Tanana Summer
Fall	Tanana Fall, Border U.S., Border Canada, Upper Canada
Fall U.S.	Tanana Fall, Border U.S.
U.S.	Lower, Middle, Tanana Fall, Border U.S.
Border Canada	Porcupine, Mainstem
Upper Canada	White, Teslin
Canada	Border Canada, Upper Canada

Yukon River Chum Salmon Mixed Stock Analysis 2015

Chum salmon were sampled from the sonar test fishery operated near Pilot Station from the end of May to the end of August in 2015 to provide for stock composition estimates for most of the summer and fall chum salmon runs. Results from analysis of these samples were reported for each pulse or time stratum and distributed by email to fishery managers within 24-48 hours of receiving the samples. For summer chum salmon, the lower Yukon River stock group comprised 73% of the run and the middle Yukon River stock group comprised 27%. The Tanana River component of the middle Yukon River stock group comprised about 2% of the total summer chum salmon run, and peaked during the sampling period of July 19 to July 22. For fall chum salmon, 67% of the run was of U.S.-origin and 33% of Canadian-origin. The composition of the U.S. contribution was 30% Tanana and 37% U.S. border (Chandalar, Sheenjek, and Black rivers). The composition of the Canadian contribution was 15% mainstem Yukon, 3% Porcupine, 14% White, and 1% Teslin rivers. Stock abundance estimates were derived by combining the passage estimates from the mainstem Yukon River sonar operated near Pilot Station with the stock composition estimates. To evaluate the concordance of various data sources, an analysis was conducted to compare these stock specific abundance estimates against escapement and harvest estimates. This analysis revealed that the stock proportions were concordant for 2004–2013 (Flannery et al. 2010; Flannery and Wenburg 2015). Postseason analysis is being conducted for the 2014 and 2015 data and preparations are underway to continue the project for the 2016 season.

8.2 MAINSTEM YUKON RIVER SONAR NEAR EAGLE

Since 2006, both Chinook and fall chum salmon passage have been estimated at Six-Mile Bend on the Yukon River near the community of Eagle, and just below the United States/Canada border, using sonar. Both split-beam and dual frequency identification sonar (DIDSON 2006–2014 and ARIS 2015) have been used (Carroll et al. 2007a; Carroll et al. 2007b).

In addition to operating the sonar, a drift gillnet program is conducted at or near Six-Mile Bend to monitor species composition, and to collect ASL data as well as genetic samples of the fish passing the sonar site. Drift gillnets, 25 fathoms in length and approximately 4.3 fathoms in depth, with mesh sizes including 5.25, 6.5, 7.5, and 8.5 inches, were fished daily to collect the samples. Although there is some minor overlap, Chinook and fall chum salmon runs appear to be largely discrete in time based on test fishery results, local knowledge of catches, and data collected in Canada. In 2015, there were no operational problems at the site, the sonar ran for the intended season length. Both sonars performed well with no major technical difficulties or failures. There were minimal interruptions to detection (caused by e.g. heavy silt or high water) except when both sonars were pulled from the water on September 4–5 because of a high water event.

In 2015, the Chinook salmon passage estimate at the mainstem Yukon River sonar operated near Eagle was 84,015 fish (83,212 lower 90% CI, and 84,818 upper 90% CI) for the dates June 30 through August 15. The fall chum salmon passage estimate at the mainstem Yukon River sonar operated near Eagle was 112,136 fish (111,152 lower 90% CI, and 113,120 upper 90% CI) for the dates August 16 through October 6. Because of the high passage of fall chum salmon when the project was terminated, the sonar estimate was subsequently adjusted to 125,095 fish. The expansion was calculated using a second order polynomial calculated for each day through October 18.

8.3 CANADA

Yukon River (Mainstem) Adult Chinook Salmon Assessment

Blind Creek Weir

In 2015, the Blind Creek weir project enumerated Chinook salmon escapement and obtained biological information from the stock for the thirteenth consecutive year. The weir was located at the same site used for the past 12 years, approximately 1 km upstream of the confluence with the Pelly River. Operation of the weir began on July 17 and continued through to August 19. The first Chinook salmon passed through the counting chamber on July 22. A total of 964 Chinook salmon were counted in 2015 (Appendix B12), which was 130% of the 10-year average escapement of 420 fish, and the second highest escapement recorded. The quarter point and midpoint of the run both occurred on August 1, on which 366 fish passed through the weir. This was 1 day earlier than the average quarter point, and 6 days earlier than the average midpoint. 597 Chinook salmon were sampled randomly for ASL throughout the period of weir operation. 210 (35%) were female and 387 (65%) were male. The mean mideye to fork (MEF) length of females and males sampled was 767 mm and 619 mm, respectively (Jane Wilson, J. Wilson & Associates; personal communication). Of the 444 samples that were successfully aged, 17.8% (28.0% of the males and no females) were age-4, 39.9% (49.6% of the males and 22.8% of the females) were age-5, 41.2 % (22.0% of the males and 74.7% of the females) were age-6, and 0.9% (no males and 2.5% of the females) were age-7.

Big Salmon Sonar

A long range dual frequency identification sonar (DIDSON) was used to enumerate the Chinook salmon escapement to the Big Salmon River in 2015. The sonar was operated for its eleventh year at the same site used since 2005, approximately 1.5 km upstream of the confluence of the Yukon River. Sonar operation began on July 15 and continued without interruption through August 20. A total of 10,071 targets were identified as Chinook salmon were counted during the period of operation, including 5 fish counted on the first partial day of operation and 10 fish counted on the last day of operations (Appendix B12). The first Chinook salmon observed passing the Big Salmon sonar station was on July 15, the first day of operations. The peak daily count of 588 fish occurred on July 29, when 36% of the run had passed the sonar site. About 50% of the run had passed the sonar by August 1 (4 days earlier than the 10 year average midpoint and 5 days later than the 2014 midpoint); 90% of the run had passed the station by August 11, which was also 4 days earlier than average (Brian Mercer, Metla Environmental Inc.; personal communication). The 2015 Big Salmon count of Chinook salmon was the highest escapement recorded, and 105% above the previous 10-year average passage of 4,911 Chinook salmon.

Genetic stock identification sampling at the mainstem Yukon River sonar operated near Eagle indicated that the Big Salmon River stock group comprised 9.7% (SD 1.9) of the Yukon River mainstem Chinook salmon escapement to Canada in 2015. This estimate was lower than the 12.2% estimate derived by comparing the Big Salmon River sonar passage to the passage of estimate from the mainstem Yukon River sonar operated near Eagle.

Carcass samples were collected between August 23 and August 25 over approximately 145 km of the Big Salmon River, yielding 133 Chinook salmon samples. Of the total, 84 (63%) fish were female and 49 (37%) fish were male. The mean MEF of females and males sampled was 828 mm and 763 mm, respectively (Brian Mercer, Metla Environmental Inc.; personal communication). Of the 97 samples which were successfully aged, 4.1% (11.1% of the males and 0.0% of the females) were age-4, 27.8% (59.0% of the males and 14.8% of the females) were age-5, and 68.0% (38.9% of the males and 85.2% of the females) were age-6.

Teslin River Sonar

Multiple beam high resolution ARIS sonars were used to enumerate the 2015 Chinook salmon escapement to the Teslin River system. This was the fourth year that the project was conducted at this site. The sonars were operated on each bank of the mainstem Teslin River at the site identified during the 2011 feasibility study, approximately 12 km upstream of the confluence of the Teslin and Yukon rivers at Hootalinqua. Right and left bank sonars began operating on July 16 and July 20, and then operated continuously through August 30. A total of 20,410 targets were identified as Chinook salmon during the period of operation (Appendix B12), this estimate was 99% higher than the previous 3-year average, and the highest escapement recorded for this project. Of this total, the right bank sonar counted 9,841 (56%) and the left bank counted 7,666 (44%) of the passing Chinook salmon. Daily 24 hour counts ranged from 25 fish (on the first full day of right bank sonar operations) to a peak count of 867 fish on August 15, 2015 (Brian Mercer, Metla Environmental Inc.; personal communication). August 9 was the midpoint of the run, 2 days earlier than the average (2012–2014) midpoint and 4 days later than in 2014.

Genetic stock identification sampling from the mainstem Yukon River sonar test fishing operations near Eagle indicated that the Teslin River stock group contributed 25.4% (SD 2.4) of

the upper Yukon River Chinook salmon escapement in 2015. In comparison, escapement indicated by the Teslin River sonar counts represented 24.7% of the total estimated Canadian escapement of 82,674 Chinook salmon.

Carcass sampling was conducted over approximately 120 km of the mainstem Teslin River from September 3 to September 13, yielding 556 Chinook salmon. Of these fish, 377 (68%) were female and 179 (32%) were male. The MEF of females and males sampled was 839 mm and 734 mm, respectively (Brian Mercer, Metla Environmental Inc.; personal communication). Of the 486 samples which were successfully aged, 0.2% (0.6% of males and no females) were age-3, 8.4% (26.0% of the males and 0.3% of females) were age-4, 37.0% (55.8% of the males and 28.3% of the females) were age-5, 48.1% (16.9% of the males and 62.7% of the females) were age-6, and 6.2% (0.6% of the males and 8.7% of the females) were age-7.

Whitehorse Rapids Fishway Chinook Salmon Enumeration

The Whitehorse Rapids Fishway is a fish ladder bypassing the Whitehorse dam that has a viewing window and trap gates on either side that are used for sampling fish without handling. Fishway staff enumerated 1,465 Chinook salmon at the Whitehorse Rapids Fishway between July 29 and September 2, 2015. Of the adult Chinook salmon counted at the Fishway, 874 were of hatchery origin, comprising 60% of the return. The hatchery component included 265 females (30%) and 609 males. The wild component included 170 females (29%) and 421 males. Female Chinook salmon made up 30% of the total run.

The Whitehorse Rapids Fishway program is a joint initiative of the Yukon Fish and Game Association, Yukon Energy Corporation, and DFO. Students count all fish moving upstream through the Fishway, record the sex and size category (small, medium, or large) of each fish, and identify hatchery-origin fish based on the absence of the adipose fin; this information on run composition supports the Whitehorse Rapids Hatchery coded wire tagging program. Students also assist the Whitehorse Rapids Hatchery with brood stock collection at the Fishway.

Hatchery personnel collected biological samples from 76 male (41 wild and 35 hatchery origin) and 40 female (12 wild and 28 hatchery origin) Chinook salmon taken from the Whitehorse Rapids Fishway for broodstock.

Whitehorse Hatchery Operations

The Whitehorse Rapids Hatchery has a current annual release target of 150,000 2.0 gram Chinook salmon fry for release upstream of dam operations to maintain stocks that migrate through the facility as juveniles. This target has been in place since 2002; releases since that time have ranged from 85,306 fry in 2008 to 176,648 fry in 2003; the 10-year average (2005–2014) is 139,789 fry (Appendix A15).

Chinook salmon fry reared at the Whitehorse Rapids Hatchery were adipose fin-clipped and injected with decimal coded wire tags in the early summer of 2015. The tagging procedure included the application of separate tag codes to each of 4 release groups. An additional tag group was assigned to Fox Creek destined fry. These fry were reared at the hatchery to accommodate ongoing upgrades at McIntyre Incubation Facility. Tagging procedures followed the standard procedures used in recent years, including the use of Tricaine methanesulphonate (MS222) to anaesthetize the fry prior to clipping and tagging.

The 2015 release was the eighteenth year in which all fit fish released from the Whitehorse Rapids Hatchery into the Yukon River were marked. With the exception of all fish released from the 1998 brood year, which were adipose-clipped but not tagged, all of the fry released from 1995–2015 brood years were coded wire tagged and adipose-clipped. The initiative to mark all of the fish released from the hatchery provides an opportunity to determine the hatchery contribution to the return as adult fish migrating upstream through the Whitehorse Rapids Fishway; it is also helpful during brood stock collection to identify origin. Fin clipping also enables researchers to distinguish hatchery fry from wild fry when investigating juvenile Chinook salmon habitat use. Marked fish are occasionally recovered in marine studies and may be captured in current smolt emigration studies at the mouth of the Yukon River.

All 143,359 Chinook salmon fry reared and marked (clipped and/or tagged) at the Whitehorse Rapids Hatchery from the 2014 brood year were released between May 31 and June 3, 2015. The fry[14] were released to various locations upstream of the Whitehorse Rapids hydroelectric dam (Appendix A15). Average fry weight at time of release was 2.28 grams; average weights ranged from 2.08 grams (Wolf Creek release) to 2.38 grams (Mainstem Yukon River release).

The estimated tag retention 3 days after tagging for the 2014 release (2014 BY) was 99%. The total 2015 release included an estimated 137,430 adipose-clipped fish with coded wire tags, 2,301 fish were estimated to have lost their tags, and 3,828 small (or unfit) fish that were clipped but not tagged (Appendix A15).

Brood stock collection began on August 12, after 248 Chinook salmon had migrated through the Whitehorse Rapids Fishway, and ended on August 30, 2015. An attempt was made to collect 2 males for each female during brood stock collection to allow matrix spawning. Matrix spawning has been used for 25 years in an effort to maintain genetic diversity. A total of 79 males were used for the brood stock program. Seventy one of these males, including 42 wild and 29 adipose-clipped (hatchery) Chinook salmon, were removed from the run, and an additional 8 males were released back to the Fishway after milt collection. The hatchery removed 7% of the total 1,030 returning Chinook salmon males.

In total, 42 female Chinook salmon (10% of the total 435 female Chinook salmon that returned to the Fishway), including 2 partially spent fish, were spawned for the Whitehorse Rapids Hatchery program between August 26 and September 10. These included 12 wild and 28 adipose-clipped (hatchery) female Chinook salmon. There were no mortalities during holding. The preliminary estimated total egg take was 218,477 green eggs. The fertilization rate was estimated to be 98%. Shocking and second inventory of the eggs began on October 15 and was completed by October 30. The estimated total egg take was then revised to 204,503, calculated from the eyed egg inventory and the 13,974 mortalities or samples that had been removed. The overall green egg to eyed egg survival was estimated to be 93%.

On November 2, 2015, an estimated 50,452 eyed eggs were transferred from the Whitehorse Rapids Hatchery to the McIntyre Creek Salmon Incubation Facility to be raised to the fry stage for the Ta'an Kwachan First Nation Fox Creek salmon restoration program. An additional 1,300 eyed eggs were provided to the Stream to Sea program for classroom incubation projects between November 4 and November 12. After these transfers and the removal of subsequent egg

[14] The fish released are referred to as fry, however virtually all of them emigrate to the ocean shortly after release, and they may more accurately be referred to as pre-smolts.

and alevin mortalities, Whitehorse Rapids inventory on December 31, 2015 was 144,951 Chinook salmon alevins.

Porcupine River Investigations

Fishing Branch River Chum Salmon Weir

Fall chum salmon returns to the Fishing Branch River have been assessed annually since 1971. A weir has been used in most years (1972–1975, 1985–1989, 1991–2012, 2015), but aerial surveys were used in some (1971, 1976–1984, 1990). In 2013–2014 spawning escapement to the Fishing Branch River was estimated based on passage of fall chum salmon by the Porcupine River sonar at Old Crow and the proportion of Porcupine River chum salmon radio tag recoveries upstream of the weir site. Spawning escapement estimates for the Fishing Branch River have ranged from approximately 5,100 fall chum salmon in 2000 to 353,300 fall chum salmon in 1975 (Appendix B15).

In 2015, the Fishing Branch River weir operated from September 11 to October 20 (first and last days were partial days). Weir installation was delayed by 11 days due to high water and the weir was pulled due to environmental conditions before the run had ended. During the weir operating period, 6,797 chum salmon, including 3,577 (53%) females and 3,220 (47%) males, were counted. Expansions to both the front and back ends of the operational period were done to account for missed fish resulting in expanded escapement estimate of 8,351 chum salmon (Appendix B15). This level of escapement was below the lower end of the Fishing Branch River escapement (IMEG) of 22,000–49,000 fish.

Porcupine River Chum Salmon Sonar

In 2015, fall chum salmon were enumerated on the Porcupine River at Old Crow using multi-beam ARIS sonars, one on each bank. This was the fifth year of this study. No gillnetting was conducted at the site for species apportionment or biological samples in 2015 due to concern over the low returns of Porcupine River chum salmon in recent years.

At the beginning of the run, apportioning sonar targets as Chinook or chum salmon is important. The chum salmon run was estimated to start on August 3 based on a left bank pulse. The Chinook salmon run was estimated to end August 19 based on the right bank proportion declining to less than half. A second order polynomial equation (Crane et al. 2011) was used to estimate the Chinook salmon (decreasing) and chum salmon (increasing) passage during this period, for each bank. At the end of the run, a second order polynomial equation (Crane et al. 2011) was applied to the last full day of counts (September 29 on the right bank and September 30 on the left bank) to expand the estimate through to a run end date of October 12.

A total of 20,705 fish targets were identified as migrating chum salmon during the operational period of the sonar project. Calculations for early season species apportionment and a post-sonar project passage expansion estimate produced an expanded passage estimate of 21,397 Porcupine River chum salmon.

In 2015, water levels encountered at the site were well above average throughout the season. For several days, water levels at a nearby survey station (09FD002) were the highest on record (records began in 1987) for those days by over 2 meters[15]. Extremely high water levels created

[15] Hydrological data are located at https://wateroffice.ec.gc.ca/report/report_e.html?type=realTime&stn=09FD002.

challenges for sonar operations and may have affected chum salmon migration. The 2015 run did not display the bimodal run pattern observed in 2012–2014, as groups of fish entered the Yukon River mouth more or less weekly throughout the season resulting in no large separations in timing that cause bimodal run patterns.

The single highest daily passage estimate of 689 chum salmon occurred on September 18. The majority (83%) of chum salmon migrated along the left bank. As in previous years, the majority of chum salmon migrated within 25 m of the sonar transducers (97.7% on right bank and 98.6% on left bank). This behavioral pattern facilitates the enumeration of these fish with multi-beam sonar.

Porcupine River Chum Salmon Telemetry

In 2015, as in 2013 and 2014, VGFN and their contractor EDI conducted a radiotelemetry study of the spawning distribution of fall chum salmon in the upper Porcupine River. Ninety-five esophageal implant radio tags were applied to fall chum salmon captured in set gillnets near the Old Crow fishery. Tags were applied between September 6 and September 26 and were relocated with fixed wing aerial surveys conducted between October 15 and October 18, and again between November 3 and November 4, 2015. Two stationary receivers were also used to relocate tagged fish: one downstream of the tagging site at Rampart House tower and one at the Fishing Branch River weir site.

Ninety of the applied radio tags were later re-located, including one that dropped below the downstream tower, 4 that were captured in the VGFN chum salmon subsistence fishery and turned in to the VGFN Natural Resources Department, 8 that were located in the vicinity of Old Crow or in other areas where spawning was not expected to occur, and 77 tags were assigned to probable spawning sites. Of the 77 tags tracked to likely spawning sites, 56 (72.7%) were located in the Fishing Branch River upstream of the tower near the weir site (Megan Sandford, Natural Resource Technologist, EDI; personal communication). Additionally, of the tags located at other spawning sites, 8 (10.4%) were located in the Fishing Branch River downstream of the weir site tower, 7 (9.1%) were in the Porcupine River mainstem, 3 (3.9%) were in the upper Bell River, 2 (2.6%) were in the Miner River, and one (1.3%) was in the upper Crow River.

The proportion of the spawning ground location tags found in the Fishing Branch River upstream of the weir site was slightly lower than the proportion (0.74) observed in this area in 2013 and higher than the proportion (0.46) observed in 2014. The proportion was slightly lower than the Fishing Branch River weir to Porcupine River sonar ratios (near 0.78) estimated in 2011 and 2012.

Porcupine River Chinook Salmon Sonar

In 2015, Chinook salmon were enumerated on the Porcupine River at Old Crow using multi-beam ARIS sonars on each bank (at the chum salmon sonar site) between June 24 and August 8. This was the second year of this project. An estimated 4,623 fish targets were identified as migrating Chinook salmon passed the sonar during this period (Ben Snow, B.Sc., R.P. Bio., EDI; personal communication).

Species apportionment for the end of the Chinook salmon run (and beginning of the chum salmon run) was estimated using the species apportionment period and method as described under Porcupine River Chum Salmon Sonar above. Calculations resulted in the addition of 228

Chinook salmon to the sonar passage estimate, for a 2015 total preliminary passage estimate of 4,851 Chinook salmon, 37% more than estimated in 2014.

Porcupine River Chinook Salmon Telemetry

In 2015, VGFN and their contractor, EDI, conducted a radiotelemetry study of the spawning distribution of Chinook salmon in the upper Porcupine River. Chinook salmon were captured in 6.0, 7.5, and 8.25 inch mesh set gillnets in the Porcupine River near Caribou Bar Creek, approximately 65 km downstream of Old Crow. Esophageal implant tags were applied to 51 salmon (17 female and 34 male). Fixed wing aerial survey flights were done to relocate the tags between August 13 and August 16, and again between September 2 and September 5. Salmon movements were also monitored with stationary receivers, one at Rampart House, 20 km downstream of the tagging site and one each at the confluence of the Miner and Whitestone rivers (Ben Schonewille, EDI; personal communication). Of the 51 tags applied, 48 were subsequently re-located: 5 tags detected at the Rampart House tower below the sonar site, 3 mortalities at the capture site, 1 mortality at the Old Crow sonar test fishing site, and 4 tags located in the vicinity of Old Crow. The remaining 35 tags were found in locations assumed to be spawning sites. Of these 35 tags, 13 (47%) were located in the Miner River, 9 (25%) were relocated in the Porcupine River mainstem, 7 (20%) were found in the Bell River watershed, 4 (11%) were found in the Fishing Branch River, and 2 (6%) were found in the Crow River (Ben Schonewille, B.Sc., R.P.Bio., EDI; personal communication).

Genetic Stock Identification of Yukon River Chinook and Fall Chum Salmon

Chinook Salmon

Genetic stock identification of the 2015 Chinook salmon migration bound for Canada was estimated using genetic samples collected from the drift gillnet test fishing program conducted in conjunction with the mainstem Yukon River sonar near Eagle. Variation of 15 microsatellite loci was surveyed from 1,031 Chinook salmon sampled between July 2 and August 20.

Chinook salmon stock contribution estimates were based on 8 regional reporting groups (stock aggregates; Table 11) and estimated by period and for the entire season (Table 12).

Table 11.–Baseline comprised of 27 stocks used to estimate stock compositions of Chinook salmon collected in the test gillnet fishery at the mainstem Yukon River sonar operated near Eagle in 2015.

Stock aggregate	Populations in baseline
North Yukon Tributaries	Chandindu and Klondike rivers
White River	Tincup Creek, Nisling River
Stewart River	Mayo, McQuesten, and Stewart rivers
Pelly River	Little and Big Kalzas, Earn, Glenlyon, Ross and Pelly rivers, Blind Creek
Mid-mainstem Tributaries	Mainstem Yukon and Nordenskiold rivers
Carmacks Area Tributaries	Little Salmon, Big Salmon, and North Big Salmon rivers, Tatchun Creek
Teslin River	Teslin Lake, Nisutlin, Morley, Jennings, and Teslin rivers
Upper Yukon Tributaries	Whitehorse Hatchery and Takhini River

Table 12.–Estimated stock composition of Chinook salmon in the test gillnet fishery at the mainstem Yukon River sonar near Eagle in 2015.

Period	Jul 2–Jul 16	Jul 17–22	Jul 23–29	Jul 30–Aug 15	Season
Sample Size	*n*=168	*n*=302	*n*=252	*n*=304	*n*=1,026
Stock aggregate	Est. (SD)	Est. (SD)	Est. (SD)	Est. (SD)	Est. (SD)
Upper Yukon Tribs.	0.0 (0.1)	2.2 (0.9)	4.8 (1.4)	9.4 (1.8)	4.6 (0.7)
Teslin River	9.1 (2.5)	20.3 (3.2)	29.2 (4.7)	43.4 (5.1)	25.4 (2.4)
Carmacks Area Tribs.	14.4 (3.5)	20.3 (3.3)	13.8 (3.0)	12.8 (3.7)	17.5 (2.0)
Mid-Mainstem	2.6 (1.5)	13.2 (2.9)	19.1 (4.2)	26.7 (4.8)	16.0 (2.2)
Pelly River	37.4 (4.7)	24.6 (3.2)	17.3 (2.9)	2.7 (1.4)	18.2(1.5)
Stewart River	8.6 (4.0)	7.7 (2.3)	11.2(2.7)	2.3 (1.5)	8.2 (1.3)
North Yukon Tribs.	13.5 (2.9)	6.0 (1.5)	1.6 (1.0)	0.3 (0.5)	4.4 (0.7)
White River	14.3 (3.1)	5.6 (1.5)	3.0 (1.1)	2.4 (1.0)	5.6 (0.8)

Note: The mainstem Yukon River sonar operated near Eagle switched from enumerating Chinook to fall chum salmon on August 16, 2015.

Passage (i.e., abundance) estimates for each stock aggregate at Eagle were calculated by multiplying the total Chinook passage estimate from sonar by the percent composition of each stock aggregate, as determined by the genetic analysis. This was done for 4 sample periods and for the season as a whole (Table 13; Figure 5).

Table 13.–Estimated abundance of Chinook salmon migrating past the mainstem Yukon River sonar near Eagle in 2015.

Period	Jul 2–Jul 16	Jul 17–22	Jul 23–29	Jul 30–Aug 15	Season
Stock aggregate Sample Size	*n*=168	*n*=302	*n*=252	*n*=304	*n*=1,026
Upper Yukon Tribs.	0	305	1,096	1,222	2,912
Teslin River	2,070	3,979	6,823	8,699	21,784
Carmacks Area Tribs.	3,231	3,829	3,235	2,516	14,636
Mid-Mainstem	603	2,531	4,469	5,350	14,148
Pelly River	8,411	4,628	4,038	554	15,265
Stewart River	1,971	1,401	2,595	462	6,832
North Yukon Tribs.	3,039	1,121	358	50	3,738
White River	3217	1,057	697	461	4,700

Note: The mainstem Yukon River sonar operated near Eagle switched from enumerating Chinook to fall chum salmon on August 16, 2015. The season estimate of stock abundances includes periods where tissue samples were not collected.

Estimated stock percentages from samples obtained at the mainstem Yukon River sonar near Eagle for 2015 are within the ranges observed between 2008 and 2014, except for the Pelly River stock aggregate, which exceeded the previous estimated proportional contribution (Appendices B18 and C17). The derived abundance estimates for the Upper Yukon, Teslin River, Carmacks Tributaries, Pelly River, Stewart River and White River stock aggregates were the highest annual estimates for the 2008–2015 period. The derived abundance estimates for the Mid-Mainstem stock aggregate was the second highest and that for the North Yukon Tributaries was the third highest.

Fall Chum Salmon

Genetic stock identification of the 2015 fall chum salmon migration bound for Canada was estimated using genetic samples collected from the drift gillnet test fishing program conducted in conjunction with the mainstem Yukon River sonar near Eagle. Variation of 14 microsatellite loci was surveyed for 475 of the 782 fall chum salmon and stock contribution estimates were based on 4 regional reporting groups (stock aggregates; Table 14). The estimated proportions of stock composition are broken down by the various sampling periods from August 1 to October 1 (Table 15).

Table 14.–Baseline comprising 9 stock aggregates used to estimate stock compositions of fall chum salmon collected from the test gillnetting program at the mainstem Yukon River sonar project near Eagle in 2015.

Stock Aggregate	Population in Baseline
Yukon Early	Chandindu River
White River	Kluane River, Kluane Lake, Donjek River
Mainstem Yukon River	Mainstem Yukon River at Pelly River, Tatchun Creek, Big Creek, and Minto
Teslin River	Teslin River

An estimated 61.9% of the return that passed the sonar site up to October 1 originated from the Mainstem Yukon River reporting group, which includes a number of mainstem Yukon River spawning populations; 37.2% were from the White River aggregate (Table 15). The 2 remaining reporting groups contributing to the run were the Teslin River and the Yukon Early group, which is represented by the Chandindu River population (Table 14).

Passage (i.e., abundance) estimates for each stock aggregate at Eagle were calculated by multiplying the total chum passage estimate from sonar by the percent composition of each stock aggregate, as determined by the genetic analysis. This was done for 4 sample periods and for the season as a whole (Table 16; and Figure 6).

Table 15.–Estimated proportions of fall chum salmon stock composition migrating past the mainstem Yukon River sonar operated near Eagle in 2015.

Period	Aug 1–Sep 6		Sep 7–22		Sep 23–Oct 1		Season	
Sample Size	*n*=150		*n*=163		*n*=162		*n*=475	
Region	Estimate	SD	Estimate	SD	Estimate	SD	Estimate	SD
Mainstem	58.3	(5.1)	55.3	(4.1)	70.6	(4.1)	61.9	(2.6)
White	36.6	(4.3)	44.1	(4.1)	28.8	(4.0)	37.2	(2.6)
Teslin	0.0	(0.2)	0.6	(1.1)	0.6	(1.0)	0.1	(0.3)
Yukon Early	5.1	(2.7)	0.0	(0.2)	0.0	(0.3)	0.8	(0.5)

Table 16.–Estimated abundance of fall chum salmon migrating past the mainstem Yukon River sonar operated near Eagle in 2015.

	Period	Aug 1-Sep 6	Sep 7–22	Sep 23-Oct 1	Season
Region	Sample Size	*n*=153	*n*=324	*n*=305	*n*=782
Mainstem		4,862	24,049	51,749	77,406
White		3,048	19,151	21,101	46,507
Teslin		1	243	444	174
Yukon Early		424	7	16	1,008
Total		8,335	43,450	73,310	125,095

The estimated chum stock proportion of the total Eagle sonar passage was above the 2009 to 2014 average for the mainstem stock group and below average for the White River chum salmon stock group, but both were within the previously observed ranges. The estimated abundance for both stock groups was below average, but also within the previously observed ranges (Appendices B19 and C18). The estimates of abundance and proportional contribution to the Eagle sonar passage of the Yukon Early stock group was above the 2009–2014 range, whereas the Teslin group was within the previously observed range for this period. However, the Yukon Early and Teslin groups comprise very small proportions of the total Eagle sonar chum salmon passage and of the genetic sample; thus, there is greater uncertainty associated with these estimates. Estimated fall chum salmon spawning escapement for tributaries represented in the genetic baseline is calculated by multiplying the genetic analysis estimate of stock aggregate proportions of the year's pooled samples by the spawning escapement estimate for the corresponding year (Figure 8; Appendix C18).

Yukon Education Program 2015

Fisheries and Oceans Canada Whitehorse and contractors have carried out Salmon in the Classroom, an educational program, since 1989. Activities include classroom lessons, presentations, salmon incubation in the classrooms, and fry releases with habitat field trips. An annual project begins prior to school starting with Chinook salmon egg collection and during school in the case of chum salmon egg collections. Egg incubation in a classroom aquarium with daily maintenance and record keeping and presentations are conducted over the course of the school year until spring when a release and interpretative habitat field trip is provided. The project involves the collection of salmon eggs from nearby salmon spawning streams, which links the students to the salmon of their local area. Students are able to release these fry back to their local stream, which enhances their understanding of the salmon life cycle, their local habitats, and helps them develop a local association of the salmon teachings they received over the course of the project. All efforts are made to collect a small number of eggs from mostly spawned salmon so as to limit disturbance to returning salmon. Chinook or chum salmon eggs are collected based on nearby populations and the linkage of the community to different salmon species. Classroom discussion and presentations include information on salmon, salmon habitat, challenges to salmon survival, and salmon anatomy through dissection in the classroom. Recently, chum salmon have been used for dissections due to low Chinook salmon returns.

Environmental Conditions Report

This summary of environmental conditions is in response to a request from the JTC to report annually on the conditions influencing fish habitat in the Canadian sub-basin of the Yukon River; the area upstream of the Alaska/Yukon border that includes the Yukon River and the Porcupine River. The sub-basin encompasses a very large expanse of salmon habitat including over 100 documented spawning streams and many more rearing streams. In lieu of annual surveys throughout these widespread spawning and rearing habitats, this brief summary serves to record significant weather conditions and resulting influences on stream conditions of the past year. The purpose of this summary is to record annual environmental conditions that may influence Yukon River Chinook salmon spawning and rearing habitat. This record may be used to determine opportunities to improve management, research, or restoration strategies and to focus habitat considerations in the future.

Specific salmon habitat information is not collected extensively from year to year; therefore, the following information is provided as a high level synopsis of what was experienced in the Canadian sub-basin for a given year. Various weather records and stream discharge data from other agencies are applied as a means to 1) determine if environmental conditions are within normal ranges on record, 2) identify observed unusual trends and/or events, and 3) consider implications for Chinook salmon. Conditions reported herein are informed through observations based on relevant activities, projects, or studies carried out by the public, fishers, consultants, and Fisheries and Oceans Canada staff. Through scientific evidence, local knowledge, experience, and professional judgement, this information is applied to fish habitat to determine general conditions experienced for the year.

November 2014 to April 2015

The Yukon was exceptionally warm and dry from October through December with well above normal air temperatures followed by a period of well below normal air temperatures in February. The winter period ended 2–3 degrees Celsius above normal throughout central and southern Yukon, with precipitation below normal for the period at all central and southern stations. As expected, water temperatures and flows dropped in October. These conditions represent the incubation and alevin development period for Chinook and chum salmon.

Snowpack conditions were variable with well below normal measurements in southwestern Yukon and well above normal conditions in northern Yukon. The Southern Lakes region experienced average to below average snowpack conditions; interior Yukon (Pelly and Stewart river basins) had near normal snowpack; and the north (Eagle Plains and Old Crow) experienced well above normal snowpack. Streamflow conditions throughout the territory were generally above normal with Pelly, Stewart, and Porcupine rivers well above normal by May (Yukon Government Snow Survey, 2015). Streamflow during this period represents base flow and generally provides an indication of groundwater contributions.

May 2015 to June 2015

Ice cover was thinner than normal on Klondike, Yukon, and Porcupine rivers, with break-up on April 28 and snowmelt peak on May 25 on the Klondike River; break-up on May 4 and snowmelt peak on May 30 on the Yukon River at Dawson; break-up on May 12 and snowmelt peak on May 15 with some minor flooding on the Porcupine River (Yukon Government Snow Survey 2015).

Spring air temperatures were well above normal with below normal precipitation in the southern two thirds of the territory. By June, average maximum air temperatures and precipitation returned to normal and water temperatures warmed quickly and flows increased steadily, cresting just at the end of June.

July 2015 to October 2015

The summer period cooled dramatically across the territory with below normal air temperatures and above average precipitation in July. Cool air and unstable rainy conditions in August with below normal air temperatures and above average precipitation (some snow) was observed across all stations. Water temperatures varied based on stored water and precipitation; streams experienced high flows and low water temperatures in much of the Canadian River Basin.

Summary

With increased climate variability, on-going habitat monitoring and assessment in the Yukon River Canadian Sub-basin is encouraged to continue to inform management, research, restoration strategies, and habitat considerations going forward.

8.4 RESTORATION AND ENHANCEMENT FUND

The *Yukon River Salmon Agreement* between Canada and the United States was initialed in March 2001 and signed in December 2002. Under the terms of the Agreement, the 2 countries established the $1.2M U.S. per annum Yukon River Salmon Restoration and Enhancement (R&E) Fund.

The purpose of the R&E Fund is to financially support:

(a) programs, projects, and associated research and management activities on either side of the Alaska Yukon border directed at restoration, conservation and enhancement of Canadian origin salmon stocks; and

(b) programs and projects directed at developing stewardship of salmon habitat and resources and maintaining viable fisheries in the Yukon River in Canada.

Seven categories or areas of activity have been established as requiring R&E funding, including:

1. Conservation,
2. Restoration,
3. Enhancement,
4. Stewardship,
5. Viable fisheries,
6. Communications, and
7. Administration. (Administrative functions receive a set allocation each year, separate from the competitively allocated R&E Funds).

The R&E funding process was initiated in early summer with a Call for Conceptual Proposals. The process is guided by the Yukon River Panel's Budget Priorities Framework and a list of Near-Term Priorities selected by the Panel from the first 6 categories of eligible activity and reflecting Panel priorities in a given year. The JTC, through its R&E subcommittee, reviewed all submitted Conceptual Proposals for their technical merit. Based on the technical merit review and the applicability of the proposed project to Panel priorities, the Panel invited selected applicants to submit a fully Detailed Proposal for stage 2 of the selection process. Detailed Proposals were reviewed by the R&E subcommittee and JTC members in mid-winter. Final funding decisions guided by these reviews were made by the Panel in its April meeting.

In 2015, a total of 30 projects were selected for R&E funding, of which, 22 were on-going multi-year projects and 8 were new (Table 17). Funds in the amount of $1,068,745 CAD and $307,803 U.S. were allocated to projects. In U.S. dollar terms 71% of the funds were directed towards Conservation projects; 11% towards Stewardship; 11% towards Communications; and 7% to Restoration.

Status of 2015 R&E Projects

Table 17.–Restoration and enhancement fund projects, cost and status for completion, listed by envelope/category type, 2015.

Project #	Project Title	Amount	Status & Due Date
CRE-78-15	Collection and Analysis of Yukon River DNA Baseline Samples in Alaska and Canada	$55,000 CAD	31-Mar-16
URE-01-15	Genetic Stock Identification of Fall Chum Salmon in Commerical Harvests, Yukon River, 2015	$82,925 U.S.	30-Jun-16
URE-05-15	Genetic Stock Identification of Fall Chum Salmon in Subsistence Harvest from the Tanana Area, Yukon River, 2015	$30,978 U.S.	30-Jun-16
URE-03-15	Yukon River Chinook Salmon Subsistence Sampling	$16,000 U.S.	31-Mar-16
URE-09-15	Rampart Rapids All Season Video Monitoring, 2015	$51,100 U.S.	31-Jan-16
CRE-79-15	Yukon River Salmon Stock Identification	$30,000 CAD	31-Mar-16
CRE-01-15	Mainstem Teslin River sonar project - 2015	$99,606 CAD	28-Feb-16
CRE-09-15	Porcupine River Sonar Program, Chinook Salmon	$122,054 CAD	31-Jan-16
CRE-10-15	Radio Tracking of Chum Salmon in the Porcupine River, Canada	$105,588 CAD	31-Jan-16
CRE-37-15	Blind Creek Chinook Salmon Enumeration Weir	$48,062 CAD	15-Feb-16
CRE-41-15	Sonar Enumeration of Chinook Salmon on the Big Salmon River	$79,670 CAD	15-Feb-16
CRE-29-15N	Stewart River Sonar Pilot Program	$37,044 CAD	31-Jan-16
URE-08-15N	Draanjik Salmon Weir, Yukon Flats National Wildlife Refuge, Alaska	$10,800 U.S.	31-Mar-16
CRE-26-15N	Big Salmon River Juvenile Chinook Out-migrant Assessment.	$39,191 CAD	31-Mar-16
CRE-11-15	Radio Tracking of Chinook Salmon and Genetic Sampling on the Porcupine River, Canada	$99,957 CAD	31-Jan-16
CRE-20-15	Temperature Monitoring of Yukon River Chinook Salmon Spawning and Migration Habitats in Canada	$6,000 CAD	31-Mar-16
CRE-22-15	Fishing Branch River Chum Salmon Habitat Assessment	$52,973 CAD	31-Oct-16
CRE-51-15	2015 Michie Creek Salmon and Habitat Monitoring Project	$23,130 CAD	31-Dec-15
	Conservation Total	**$798,275 CAD**	
		$191,803 U.S.	
CRE-28-15N	Southern Lakes Chinook Restoration and Enhancement	$19,200 CAD	31-May-16
CRE-25-15	Fox Creek Salmon Restoration Project	$19,000 CAD	31-Dec-15
CRE-16-15	Yukon River Chinook Salmon Mainstem Outplant Program Spawning Evaluation	$13,960 CAD	31-Oct-15
CRE-18-15N	Teslin River Chinook Stock Restoration Investigation	$19,300 CAD	31-Jan-16
CRE-23-15N	Yukon River Chinook Salmon Hatchery Augmentation Feasibility Assessment and Development	$28,000 CAD	31-Mar-16
	Restoration Total	**$99,460 CAD**	

-continued-

Table 17.–Page 2 of 2.

Project #	Project Title	Amount	Status & Due Date
CRE-02-15	Salmon Stewardship Coordinators for Yukon Schools	$29,550 CAD	30-Jun-16
CRE-06-15	Yukon River North Mainstem Stewardship	$31,460 CAD	31-Dec-15
CRE-19-15N	Yukon River Chinook Salmon and Stock Restoration Community Technical Advisor	$75,000 CAD	31-Mar-16
	Stewardship Total	**$136,010 CAD**	
CC-01-15	Yukon River Inseason Management Teleconferences	$10,000 U.S.	31-Mar-16
CC-02-15	Yukon River Educational Exchange Trip	$35,000 U.S.	31-Mar-16
CC-03-15	Yukon River Preseason Planning Process	$71,000 U.S.	31-Oct-16
CC-04-15N	Yukon River Chinook Salmon Stock Restoration Education Initiative	$35,000 CAD	31-Mar-16
	Communication Total	**$35,000 CAD**	
		$116,000 U.S.	
	Total Canadian dollars	**$1,068,745 CAD**	
	Total U.S. dollars	**$307,803 U.S.**	
	Grand Total in U.S. dollars at 0.9% exchange rate	**$1,269,673 U.S.**	

Note: CRE=Canadian Restoration and Enhancement Proposal, URE=U.S. Restoration and Enhancement Proposal, N=New Proposal, CC=Communications Committee Project, and CAD=Canadian.

9.0 MARINE FISHERIES INFORMATION

9.1 INTRODUCTION

Yukon River salmon migrate into the Bering Sea during the spring and summer after spending 0, 1, or 2 winters rearing in fresh water, depending on the species. Information on stock origin from tagging, scale pattern, parasites, and genetic analysis indicate that Yukon River salmon are present throughout the Bering Sea, in regions of the North Pacific Ocean, south of the Aleutian chain, and the Gulf of Alaska during their ocean migration (Healey, 1991; Salo 1991). Yukon River salmon have the potential to be captured by fisheries that harvest mixed stocks of salmon, other species of fish (bycatch), and by illegal fishing activities throughout their oceanic distribution. Recovery of coded-wire tags in these fisheries provides one of the key descriptors of the oceanic distribution of Yukon River Chinook salmon (Whitehorse Rapids Chinook salmon; Appendix A18). U.S. groundfish trawl fisheries in the Gulf of Alaska (GOA) and Bering Sea-Aleutian Islands (BSAI) management areas are managed to limit the incidental harvest (bycatch) of salmon stocks that include Yukon River salmon. Bycatch levels in these trawl fisheries as well as stock identification program used to assign origin of salmon captured in these fisheries are included here. Juvenile abundance estimates for the Canadian-origin stock group of Chinook salmon from pelagic trawl research surveys by the Alaska Fisheries Science Center are also included as a leading indicator of stock status for Yukon River Chinook salmon.

9.2 SALMON BYCATCH IN THE BERING SEA AND GULF OF ALASKA GROUNDFISH FISHERIES

U.S. groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) regions are managed under the Magnuson-Stevens Fisheries Conservation and Management Act by the North Pacific Fishery Management Council (NPFMC), and are regulated by the National Marine Fisheries Service (NMFS) Alaska Regional Office. Annual summaries and inseason information on Pacific salmon bycatch in the Bering Sea and Gulf of Alaska groundfish fisheries are provided by the Alaska Regional Office as part of NMFS catch accounting system (NMFS 2012). Bycatch of Chinook salmon in the BSAI and GOA remained at relatively low levels in 2015 (Appendices A19, A20, and A21). Bycatch of Chinook salmon was higher in BSAI groundfish fisheries (n = 25,250) than GOA groundfish fisheries (n = 18,965) during 2015. Bycatch levels of Chinook salmon were higher in the A-season (n = 17,503) than the B-season (n = 7,747) in the BSAI groundfish fisheries. Bycatch of non-Chinook salmon species (predominately chum salmon) in the BSAI groundfish fisheries during 2015 was similar to 2014 at 243,342, with nearly all non-Chinook species captured during the B-season (n = 237,229).

Pollock directed fisheries in the Bering Sea have been the primary groundfish fishery of concern for salmon bycatch as they account for 88% of the total Chinook salmon bycatch and 99% of the non-Chinook salmon bycatch in the BSAI groundfish fisheries (Appendix A23). Harvests are managed in the BSAI pollock fishery by setting an annual total allowable catch (TAC) for pollock and allocating the catch to various sectors of the fishery as specified by the American Fisheries Act in 1998. These allocations are divided into 2 seasons, 40% to the winter roe season (January 20 to June 10; A-season) and 60% to summer/fall season (June 10 to November 1; B-season). Chinook salmon bycatch occurs in both the winter season (61%) and the summer/fall season; non-Chinook salmon are caught almost entirely during the summer/fall season (99%; Appendix A23).

A variety of regulatory measures have been used to limit salmon bycatch in the GOA and BSAI groundfish fisheries. These measures include: classifying salmon as a prohibited species, salmon savings areas, and a voluntary rolling hotspot system (VRHS). Prohibited species within U.S. groundfish fisheries must be either discarded or donated through the Pacific Salmon Donation Program, which allows for distribution of salmon taken as bycatch to economically disadvantaged individuals by tax exempt organizations. Chinook and Chum Salmon Savings Areas were created in the mid-1990s as part of the BSAI groundfish fisheries. These savings areas enabled cap-and-closure measures to limit salmon bycatch in the Bering Sea pollock fishery. Savings areas are based on locations with historically high spatial and temporal levels of salmon bycatch and were closed to fishing once salmon bycatch levels reached a specified cap. In 2006, fishing vessels participating in the VRHS were exempted from the salmon savings areas. The VRHS is intended to increase the ability of the pollock fishery to minimize salmon bycatch by adaptively defining area closures with inseason bycatch information.

Escalating numbers of Chinook salmon captured as bycatch in the BSAI pollock fishery in 2006 and 2007 prompted a review of alternative management measures used to limit the bycatch of Chinook salmon and an environmental impact assessment of Chinook salmon bycatch in the Bering Sea pollock fishery (NMFS 2009a, NMFS 2009b). Following these reviews, the NPFMC recommended amendment 91 (http://www.fakr.noaa.gov/frules/75fr53026.pdf, http://www.fakr.noaa.gov/frules/75fr58337.pdf) be added to the *BSAI Groundfish Fisheries*

Management Plan for the Bering Sea pollock fishery. Amendment 91 was implemented by NMFS during the 2011 fishing season and established a bycatch hard-cap of 60,000 Chinook salmon and a performance cap of 47,591 Chinook salmon for vessels participating in an incentive plan agreement (IPA). Chinook salmon bycatch quotas are allocated to each season and sector of the fishery based on bycatch caps, historical Chinook salmon bycatch, and pollock harvest allocations; however, provisions are made in the amendment to transfer unused quotas under the approval of the NMFS Alaska Regional Office. Performance caps establish benchmark performance criteria of incentive plan agreements, the primary tool used to minimize salmon bycatch. Sectors that exceed their proportion of the performance cap more than 2 times in any 7 year period while participating in an IPA will have their hard cap reduced to their proportion of the performance cap. Salmon still retain their classification of a prohibited species; however, amendment 91 establishes benchmark performance criteria for incentive plan agreements such as the voluntary rolling hotspot system that have been used or may be used in the future to avoid salmon bycatch in the Bering Sea pollock fishery.

9.3 NORTHERN BERING SEA PELAGIC TRAWL SURVEYS

Pelagic trawl surveys in the northern Bering Sea shelf were initiated in 2002 as part of the Bering-Aleutian Salmon International Survey (BASIS: 2002–2007). BASIS was developed by member nations of the North Pacific Anadromous Fish Commission (NPAFC) (United States, Russia, Japan, Canada, and Korea) to improve our understanding of marine ecology of salmon in the Bering Sea. The United States (Alaska Fisheries Science Center, Auke Bay Laboratories) continued pelagic trawl surveys in the northern Bering Sea in support of the Bering Sea Integrated Ecosystem Research Project (BSIERP) in 2009 and 2010. Funding support for the northern Bering Sea trawl studies in 2011 was provided by the Alaska Sustainable Salmon Fund and the Arctic Yukon Sustainable Salmon Initiative to specifically address Yukon River juvenile Chinook salmon. Northern Bering Sea pelagic trawl surveys were completed in 2012 and 2013 as part of Arctic Eis, a multi-disciplinary Arctic research program led by the University of Alaska and the Alaska Fisheries Science Center. Salmon catch data collected during these fisheries and oceanographic surveys provide a unique opportunity to evaluate the status of salmon stocks during their juvenile life-history stage. Vessel support for trawl surveys in 2014 and 2015 were provided by the State of Alaska's Chinook Salmon Initiative program as part of a calibration study between large and small vessels. Yukon River Chinook salmon are the predominate stock group in the northern Bering Sea (Murphy et al. 2009); and stock-specific juvenile abundance estimates in the Northern Bering Sea are used to provide an early indicator of Canadian-origin Chinook salmon production to inform pre-season management decisions (Figure 7). The juvenile index in 2012 and 2013 will be the primary contributors to the 2016 return as Chinook salmon typically return to the Yukon River after spending 3 to 4 years in the ocean. The increase in juvenile abundance in 2013 should help improve the return numbers in 2016; returns should continue to increase after 2016 based on the preliminary estimates of juvenile abundance in 2014 and 2015.

10.0 RUN OUTLOOKS 2016

10.1 YUKON RIVER CHINOOK SALMON

Canadian-Origin Yukon River Chinook Salmon

The preseason outlook range for Canadian-origin Chinook salmon run size in 2016 is 65,000 to 88,000 fish, which was a similar run size to that of 2015. Several sources of information were considered in developing the 2016 forecast.

The Chinook salmon run on the Yukon River is typically dominated by age-5 and age-6 fish. The brood years producing these age classes in 2016 are 2010 (age-6) and 2011 (age-5). The Canadian-origin upper Yukon River Chinook salmon spawning escapements in 2010 and 2011 were 32,009 and 46,307 fish, respectively, both of which were below average escapements (Appendix A9; Figure 8). In the past 15 years, odd-year runs (2001, 2003, 2005, 2007, 2009, and 2011) have generally tended to be larger than prior and subsequent even-year runs, due to a stronger age-6 component returning (Figure 9). However, the 2013 Chinook salmon run had a weaker age-5 component than anticipated and ended up being one of the lowest Chinook salmon runs on record. In 2014, the age-6 component was also subsequently weak, but a strong age-5 component returned, resulting in a larger run size than 2013. The run in 2015 was stronger than 2014, partially due to the high relative abundance of age-4 and age-6 fish. In 2015 the estimated return of age-4 fish was the highest since 1989 (Appendix A9) and may indicate a strong return of age-5 fish for 2016.

Spawner-recruitment and sibling models predict the 2016 run size of Canadian-origin Chinook salmon will be as high as 97,000 and 108,000 fish, respectively (Table 18). The average of those 2 models indicates a return of about 103,000 Chinook salmon. However, these models do not account for uncertainty associated with lower productivity observed in recent years. Over the past 9 years, observed run sizes were approximately 36% lower than preseason outlooks developed with the spawner-recruitment model, 31% lower than preseason outlooks developed with the sibling model, and 33% lower than preseason outlooks developed by averaging the 2 models.

This year, the average of the 2 model predictions yielded an unadjusted of 103,000 Chinook salmon. Model performance, estimated as the ratio of observed to predicted run size, was averaged for 2007–2014 to obtain a correction factor of 0.64, which was then applied to the unadjusted (model average) forecast. The adjusted outlook obtained by this method was 65,000 Chinook salmon. Years included in the correction factor calculation were chosen because they represent the years when the model forecasts most differed from each other or from the observed return, thus representing the most variability in performance. This outlook was used for the lower end of the outlook range.

Returns in 2015 indicated an improvement in the forecasting performance of the models (i.e. the observed run size was only 13% lower than the uncorrected forecast for 2015). Futhermore, age composition of the 2015 run indicates that brood years returning in 2016 might be as productive or more productive than the brood years returning in 2015. Thus the model performance in 2015 was used for the correction factor (0.87) to obtain the upper end of the outlook range of 88,000 fish.

This suggests a run size in 2016 similar to the run size 2015. The predicted run size is above the recent actual run size average of 62,000 fish but below the historical average (1989 to 1998) run size of 146,000 fish.

Performance of Stock-Recruitment Models for the Years 2000–2015

A review of preseason outlook performance provides an opportunity to document the recent trend in the upper Yukon River Chinook salmon recruits per spawner values. Revised historical Canadian run size estimates were used to reconstruct the 2000 and 2001 runs. The preseason outlook is derived using spawner-recruitment and sibling model projections compared to postseason estimates of run size (Table 18). As stated previously, the preseason estimates derived from each model are corrected based on average performance to create a range. Despite good brood year escapements, the observed run sizes were relatively low from 2000 to 2002 and from 2007 to 2014. The causes of low returns are unknown but likely involve a number of factors in the marine and freshwater environments. These unknown factors may explain some of the variability seen in the performance of the projection models from year to year. For example, the 2008 outlook of 117,000 Chinook salmon overestimated the run size by a factor of 1.77, or 77% above the actual run, whereas the 2015 run projection performance was 1.1. It will be important to determine if the low run sizes observed in the 2007 to 2014 period develop into a long-term trend, or whether the improved performance seen in 2015 indicates the beginning of an increasing trend in productivity.

Table 18.–Preseason Canadian-origin Yukon River Chinook salmon outlooks for 2000–2016 and the observed run sizes for 2000–2015.

	Predicted run size (preseason)					Postseason estimate and model performance		
				Adjusted outlook range[a]			Model performance (observed/predicted run size)	
Year	Spawner-recruit	Sibling	Model average[b]	Low end[b]	High end[b]	Observed run size[c]	Spawner-recruit	Sibling
2000	127,784	85,889	107,000			53,000	0.41	0.62
2001	126,641	51,082	89,000			86,000	0.68	1.68
2002	113,759	107,496	111,000			82,000	0.72	0.76
2003	116,948	109,577	113,000			150,000	1.28	1.37
2004	123,469	124,326	124,000			117,000	0.95	0.94
2005	121,764	117,860	120,000			124,000	1.02	1.05
2006	115,995	123,132	120,000			119,000	1.03	0.97
2007	118,557	139,934	129,000			88,000	0.74	0.63
2008	111,551	122,435	117,000			63,000	0.56	0.51
2009	98,172	103,541	101,000			88,000	0.89	0.85
2010	109,797	116,346	113,000			60,000	0.54	0.51
2011	102,831	113,323	108,000			72,000	0.70	0.63
2012	106,090	87,167	97,000	54,000	73,000	48,000	0.46	0.56
2013	109,984	79,160	95,000	49,000	72,000	37,000	0.34	0.47
2014	100,159	53,287	77,000	32,000	61,000	65,000	0.65	1.22
2015	96,083	103,701	100,000	59,000	70,000	87,300	0.92	0.86
2016	97,028	107,996	103,000	65,000[d]	88,000[d]			

[a] From 2012 to 2015, the Spawner-recruitment model and Sibling model based outlooks have been adjusted by applying average (2007–2015) model performance (percent difference from expected) to the projection and rounding to the nearest one thousand to create an "adjusted outlook range".

[b] Numbers rounded to nearest one thousand.

[c] Estimated Run size is the border passage estimate plus the U.S. and Canada harvest of Canadian-origin Chinook salmon. U.S. harvest estimates are determined using Canadian stock genetic proportion estimates applied to Alaska harvest.

[d] The 2016 adjusted outlook uses the average of the 2 model forecasts and applies a correction factor (2007–2014 average performance) for the lower end and the correction factor seen in 2015 for the upper end.

Revised Canadian-origin Chinook Salmon Database

The estimation of border passage was developed from a combination of radiotelemetry data (2002–2004) and mainstem sonar estimates (2005–2007). Total spawning escapements for 2002 to 2007 were calculated by subtracting the Canadian catch from these estimates. Starting with 2005 when border passage began to be estimated by means of the sonar project near Eagle, U.S. harvest between the sonar project site and the Canadian border also must be subtracted to estimate escapement of Canadian Chinook salmon. Linear regression of the estimated total spawning escapements for 2002–2007 against a 3-area aerial survey index of Big Salmon, Little

Salmon, and Nisutlin rivers was used to reconstruct historical Canadian spawning escapement estimates from 2001 back to 1982 (Appendix B11). These estimates replaced the earlier border and spawning escapement estimates, derived from the DFO Chinook salmon mark–recapture program. Information from a number of sources, reviewed in 2008, indicated that the earlier mark–recapture derived border and spawning escapement estimates were likely biased low. The current method of estimating border passage (used since 2005) is the mainstem Eagle sonar estimate minus the U.S. harvest above the sonar project. The spawning escapement is calculated by subtracting the Canadian harvest from the border passage estimate.

Age-specific returns have been calculated based on age, harvest and escapement data in the return years (Appendix A9). The resulting database forms the basis for the current stock-recruitment model. The JTC is pursuing further statistical run reconstruction analyses to improve historic run size estimates.

Drainagewide Chinook Salmon

The outlook for the total Yukon River Chinook salmon run can be estimated by applying historical average proportions of Canadian-origin fish in the total run to the outlook estimated for the Canadian component of the run. The average proportion of Canadian-origin fish in the total run is approximately 50%. The drainagewide run outlook range for 2016, based on the adjusted Canadian-origin model estimates, is 130,000–176,000 Chinook salmon. A run of this size could have the potential to provide for escapements and allow for some subsistence harvest. The historical average drainagewide Chinook run size from 1989 to 1999 was 293,000 fish. Since that time, there has been a marked reduction in productivity (despite cessation of targeted commercial fishing for Chinook salmon and drastic decreases in subsistence harvest). The recent 5-year average (2011–2015) drainagewide Chinook salmon run size is approximately 127,000 salmon, which is less than half the historical average of a previous decade (1989–1999). The projected 2016 Yukon River Chinook salmon run therefore may be above the recent average but from a historical perspective, is still considered below average.

During the winter and spring, ADF&G and USFWS fisheries managers will attend meetings with stakeholders, including the Yukon River Panel meeting, to provide information about the 2016 outlook and other topics and discuss management options. The meetings provide a forum to discuss options and practical management strategies in 2016 that will assist in preparing for the possibility that the Chinook salmon run could be similar to the below average runs of 2007-2015.

10.2 YUKON RIVER SUMMER CHUM SALMON

The strength of the summer chum salmon run in 2016 will be dependent on production from the 2012 (age-4 fish) and 2011 (age-5 fish) escapements, as these age classes generally dominate the run. The total runs during 2011 and 2012 were approximately 2.2 million and 2.4 million summer chum salmon, respectively. The escapement goal on the Anvik River (350,000–750,000 fish) was achieved in 2011 and 2012, and the escapement goal on the East Fork Andreafsky River (>40,000 fish) was also met in both years. Yukon River summer chum salmon generally exhibit strong run size correlations among adjacent years, and it is expected that the 2016 total run in the Yukon River will be slightly lower than the 2015 run of approximately 1.8 million fish.

The 2016 run is anticipated to provide for escapements, a normal subsistence harvest, and a surplus for commercial harvest. Summer chum salmon runs have provided for a harvestable surplus in

each of the last 13 years (2003–2015). If inseason indicators of run strength suggest sufficient abundance exists to allow for a commercial fishery, the commercially harvestable surplus in Alaska could range from 450,000 to 950,000 summer chum salmon. Similar to the last 3 years, however, commercial harvest of summer chum salmon in 2016 could be affected, if the Chinook salmon run is below average, by measures taken to protect the Chinook salmon from incidental harvest in chum salmon-directed fisheries.

10.3 YUKON RIVER FALL CHUM SALMON

Drainagewide Fall Chum Salmon

Preseason outlooks are determined using estimates of escapement and resulting production. Yukon River drainagewide estimated escapement of fall chum salmon for the period 1974 through 2009 have ranged from approximately 223,000 (2000) to 2,200,000 (1975) fish, based on Bayesian analysis of escapement assessments to approximate overall abundance (Fleischman and Borba 2009). Escapements in these years resulted in subsequent returns that ranged in size from approximately 318,000 (1996 production) to 2,900,000 (2001 production) fish. Corresponding return per spawner rates ranged from 0.3 to 8.8, averaging 1.76 for all years combined (1974–2009).

A considerable amount of uncertainty has been associated with these run forecasts, particularly in the last decade, because of unexpected run failures (1998 to 2002) followed by strong runs from 2003 through 2008. Weakness in these salmon runs prior to 2003 was generally attributed to reduced productivity in the marine environment and not to low levels of parental escapement. Similarly, improvements in productivity (2007–2010) have been attributed to the marine environment. Forecasts have been presented as ranges since 1999 to allow for adjustments based on more recent trends in production. Historical ranges included the normal point projection as the upper end and the lower end was determined by reducing the projection by the average ratio of observed to predicted returns from 1998 to each consecutive current year through 2004. In 2005, the average ratio of 2001 to 2004 was used in attempt to capture some of the observed improvement in the run. The point estimate for 2006 and 2007 used 1974 to 1983 odd/even maturity schedules to represent years of higher production, whereas 2008–2012 used 1984 to current year odd/even maturity schedules to represent years of lower production (Appendix A22). With the dissipation of the even/odd cycles in the past 16 years the trend is not as clear in the dataset, therefore, the maturity schedule for all completed brood years 1974–2009 (Appendix A22) was used to determine the point estimates in 2013–2016.

Yukon River fall chum salmon return primarily as age-4 and age-5 fish, although age-3 and age-6 fish also contribute to the run (Appendix A22). The 2016 run will be composed of brood years 2010 to 2013 (Table 19). Estimates of returns per spawner (R/S) were used to estimate production for 2010 and 2011. An auto-regressive Ricker spawner-recruit model was used to predict returns from 2012 and 2013. The point projection estimates for 2016 used the 1974 to current complete brood year returns applied to the odd/even maturity schedule. The result is an estimate of 666,000 fall chum salmon returning in 2016. The forecast range is based on the upper and lower values of the 80% confidence bounds for the point projection. Confidence bounds were calculated using deviation of point estimates and observed returns from 1987 through 2015. Therefore, the 2016 forecasted run size is expressed as a range from 550,000 to 780,000 fall chum salmon (Table 19). This forecasted run size is below average for even-numbered year runs (1974–2014).

Table 19.–Forecasted 2016 total run size of fall chum salmon based on parent year escapement for each brood year and predicted return per spawner (R/S) rates, Yukon River, 2010–2013.

Brood Year	Escapement	Estimated Production (R/S)	Estimated Production	Age	Contribution based on age	Current Return
2010	489,900	1.50	734,850	6	1.3%	8,810
2011	891,200	0.69	614,928	5	22.8%	152,155
2012	683,600	1.06	726,532	4	71.6%	477,046
2013	883,600	1.05	931,976	3	4.2%	28,163
Total expected run (unadjusted)						666,000
Total 2016 run size expressed as a range based on the forecasted vs. observed returns from 1987 to 2015 (80% CI):						550,000 to 780,000

The dominant parent year escapements contributing to this outlook are 2011 and 2012, both of which exceeded the upper end of the drainagewide escapement goal range of 300,000 to 600,000 fall chum salmon (Appendix C16). With the low abundance of age-4 fish in the 2011 brood year, production appears to have dropped below replacement once again and the remainder of the brood years are hovering near replacement. The major contributor to the 2016 fall chum salmon run is anticipated to be age-4 fish returning from the 2012 parent year (Appendix A18). The decline in the 2015 run may have been caused in part by high spawning density which may be a factor in the next few years.

For fall chum salmon, the sibling relationship is best between the age-5 to age-6 component (R^2=0.57). Typically, the sibling relationship between the age-3 to age-4 fish (R^2=0.49) is better than the age-4 to age-5 fish (R^2=0.27). Brood year returns of age-3 fish range from zero to 199,000 chum salmon. Returns of age-4 fish from even-numbered brood years during the time period 1974 to 2009 typically averaged 453,000 fall chum salmon, and in all years ranged from a low of 175,000 for brood year 1996 to a high of 2,045,000 for brood year 2001. Return of age-5 fish from the same time period for even-numbered brood years typically averaged 207,000 fall chum salmon, and in all years ranged from a low of 59,000 fish for brood year 1998 to a high of 705,000 fish for brood year 2001. Considering the sibling relationship described, there is a slight chance that the above average age-3 fish observed in 2015 could bolster the return of age-4 fish in 2016.

As mentioned previously, a consideration for the decline in expected age-4 return observed in 2015 is how well returns from large escapements (>800,000) produce, since 8 out of 9 failed to yield replacement values. The most recent high production levels of 2.00 R/S (average R/S 1998 to 2003 completed brood years, excluding 2001) are well above the poor returns observed in 1994–1997 (average 0.44 R/S). Production in 2005 was at a record low of 0.27 R/S, indicating poor survival; however, 2006 through 2009 have increased each year, respectably, as predicted. Production began dropping with the 2010 brood year. The fluctuations observed in fall chum salmon run sizes (postseason run size estimates) in comparison with the expected run sizes (preseason outlooks) are reflected in the outlook performance; i.e., proportions of the expected run size, observed for the 1998 to 2015 period (Table 20).

During the 2016 fall fishing season, estimated strength of the projected run will be adjusted using summer chum salmon run abundance and assessed based on various inseason monitoring project data. With a projected run size range of 550,000 to 780,000 fall chum salmon (midpoint 666,000

fish; Table 20), it is anticipated that escapement goals will be met while supporting normal subsistence fishing activities. At the January 2016 Board of Fisheries meeting 5 AAC 01.249 *Yukon River Drainage Fall Chum Salmon Management Plan* (Appendix A5) was revised to raise the threshold for commercial fishing to 550,000 fish. The forecast suggests a commercial surplus between 50,000 and 230,000 fall chum salmon maybe available. However commercially harvestable surpluses will be determined inseason and applied to the guidelines outlined in the management plan with further considerations of fishing effort and buying capacity.

Table 20.–Preseason Yukon River drainagewide fall chum salmon outlooks 1998–2016 and observed run sizes 1998–2015.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Proportion of Expected Run
1998	880,000	322,000	0.37
1999	1,197,000	415,000	0.35
2000	1,137,000	239,000	0.21
2001	962,000	381,000	0.40
2002	646,000	424,000	0.66
2003	647,000	773,000	1.19
2004	672,000	613,000	0.91
2005	776,000	2,280,000	2.94
2006	1,211,000	1,161,000	0.96
2007	1,106,000	1,127,000	1.02
2008	1,057,000	899,000	0.85
2009	791,000	577,000	0.73
2010	690,000	607,000	0.88
2011	737,000	1,208,000	1.64
2012	1,114,000	969,000	0.87
2013	1,029,000	1,228,000	1.18
2014	932,000	1,020,000	1.09
2015	1,060,000	843,000	0.80
2016	666,000		
Avg. (1998–2015)	925,000	838,000	0.95

Note: Run sizes are rounded to nearest one thousand. The expected run sizes are point estimates that ranges were developed for since 1999 however the ranges were not always distributed around the point estimate (1999–2005, see annual JTC reports for methods). From 2006 to present expected run sizes are the midpoints of the outlook range.

Canadian-Origin Upper Yukon River Fall Chum Salmon

To develop an outlook for the 2016 Canadian-origin Yukon River fall chum salmon, the drainagewide outlook range of 550,000–780,000 fall chum salmon was multiplied by 25% (the estimated mainstem Yukon River Canadian-origin contribution), producing an outlook range of 137,000–195,000 fish (midpoint of 166,000 fish). Recent genetic stock identification analyses have indicated that this assumption (i.e., 25%) is reasonably close. The preliminary 2016 outlook is below the average run size for 1998–2015 of 214,000 fish (Table 21).

Table 21.–Preseason Canadian-origin mainstem Yukon River fall chum salmon outlooks for 1998 to 2016 and observed run sizes for 1998–2015.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Performance of Preseason Outlook
1998	198,000	70,000	2.83
1999	336,000	116,000	2.90
2000	334,000	66,000	5.06
2001	245,000	49,000	5.00
2002	144,000	113,000	1.27
2003	145,000	182,000	0.80
2004	147,000	193,000	0.76
2005	126,000	558,000	0.23
2006	126,000	330,000	0.38
2007	147,000	347,000	0.42
2008	229,000	269,000	0.85
2009	195,000	128,000	1.52
2010	172,000	143,000	1.20
2011	184,000	326,000	0.56
2012	273,000	238,000	1.15
2013	257,000	303,000	0.85
2014	230,000	223,000	1.03
2015	265,000	205,000	1.29
2016	166,000		
Average (1998–2015)	209,000	214,000	1.56

Note: Run sizes are rounded to nearest one thousand. The 2009 through 2016 preseason expected run sizes are the midpoint of the outlook range.

Canadian-origin Porcupine River Fall Chum Salmon

In the Canadian section of the Porcupine River, most of the production of fall chum salmon originates from the Fishing Branch River. Canadian-origin Porcupine stocks have been estimated to comprise 5% of the drainagewide run. Fishing Branch River fall chum salmon have been estimate to comprise about up 80% of the Canadian-origin Porcupine stocks, or 4% of the drainagewide run, though estimates have ranged from 1.3% to 7%. Applying the 4% average estimate to the drainagewide outlook range of 550,000–780,000 fish yields a Fishing Branch River outlook of 22,000–31,000 fish, with a midpoint of 27,000 fish. Because of the variation observed with this estimate, the outlook is considered uncertain.

A preliminary Fishing Branch River stock-recruit model also suggests an outlook in this range. There are a number of assumptions made by this model. The primary assumption is that the proportion of Fishing Branch River fall chum salmon in the total U.S. fall chum harvest is equal to the proportion of the escapement of Fishing Branch River fall chum salmon in the drainagewide escapement. There is little data on stock composition of the U.S. harvest of fall chum salmon. As a result, the assumption cannot be verified at this time and the outlook based on this model is uncertain.

Though the models used to develop preseason outlook varied from year-to-year, the postseason run size estimates of Fishing Branch River fall chum salmon have been consistently below preseason outlooks since 1998, with the exception of 2003–2005 (Table 22).

Table 22.–Preseason Fishing Branch River fall chum salmon outlooks for 1998–2016 and observed run sizes for 1998–2015.

Year	Expected Run Size (Preseason)	Estimated Run Size[a] (Postseason)	Performance of Preseason Outlook
1998	112,000	25,000	4.48
1999	124,000	24,000	5.17
2000	150,000	13,000	11.54
2001	101,000	33,000	3.06
2002	41,000	19,000	2.16
2003	29,000	46,000	0.63
2004	22,000	32,000	0.69
2005	48,000	186,000	0.26
2006	54,000	48,000	1.13
2007	80,000	50,000	1.6
2008	78,000	30,000	2.6
2009	49,000	40,000	1.23
2010	43,000	20,000	2.15
2011	37,000	28,000	1.32
2012	55,000	50,000	1.1
2013	52,000	39,000 (52,000)[b]	–
2014	46,000	13,000 (24,000)[b]	–
2015	17,000	13,000	1.3
2016	27,000		
Average (1998–2012)	63,000	39,500	2.51

Note: Run sizes are rounded to nearest one thousand. The 2009 through 2014 preseason forecasted run sizes are the midpoint of an outlook range. The Fishing Branch River weir monitors the dominant spawning stock within the Porcupine River drainage.

[a] The total run size is estimated by adding the Canadian Porcupine chum harvest and the estimated U.S. harvest of Fishing Branch chum to the escapement estimate based on Fishing Branch River weir passage, unless otherwise noted. In recent years, the proportion of Fishing Branch River fall chum in the total U.S. fall chum harvest is assumed to be equal to the proportion of Fishing Branch River escapement in the drainagewide fall chum escapement.

[b] Run size was based on Old Crow sonar counts and proportion of tag recoveries. Numbers in parentheses are the Canadian-origin Porcupine River sonar based estimates. Outlook performances are not included due to uncertainty in the assessment methods compared with previous years.

10.4 YUKON RIVER COHO SALMON

Although there is little comprehensive escapement information for Yukon River drainagewide coho salmon, it is known that coho salmon primarily return as age-2.1 fish (4-year-old, age in European notation) and overlap in run timing with fall chum salmon. The major contributor to the 2016 coho salmon run will be age-4 fish returning from the 2012 parent year. Based on the run reconstruction index (1995–2015, excluding 1996 and 2009), the 2012 escapement was estimated to be 83,000 coho salmon which was well below average (142,000). In 2012, an increased number of coho salmon were harvested incidentally in the directed fall chum salmon commercial fisheries. Subsistence harvest in 2012 was slightly above the 1995–2014 average of 20,000 coho salmon.

Escapements are primarily monitored in the Tanana River drainage. The Delta Clearwater River (DCR) is a major producer of coho salmon in the upper Tanana River drainage and has comparative escapement monitoring data since 1972. The DCR parent year escapement of 5,230 fish in 2012 was slightly above the lower end of the SEG range of 5,200 to 17,000 coho salmon. Four other locations in the Tanana River drainage were surveyed for coho salmon specifically; all

of which were below average when compared to the recent 5-year average (2010–2014) escapements. Very informal coho salmon outlooks are made preseason based on average survival of the primary parent year escapement estimate, which in 2016 would indicate that the return would be below average. However, the last 2 years of returns (2014–2015) have been high abundance years which may indicate good productivity which typically cycles for several years in succession; thus, it would not be unexpected if the 2016 return was average to above average.

11.0 STATUS OF ESCAPEMENT GOALS

11.1 SPAWNING ESCAPEMENT TARGET OPTIONS IN 2016

Canadian-origin mainstem Yukon River Chinook and fall chum salmon are managed under the umbrella of the Yukon River Salmon Agreement (YRSA). The Yukon River Panel meets annually and recommends escapement goals to the Canadian and U.S. management agencies.

Canadian-origin Mainstem Yukon River Chinook Salmon

In 2010, the Panel adopted an IMEG range of 42,500–55,000 Chinook salmon. In the absence of a biological escapement goal, i.e. a goal based on a production or population model, the IMEG has been retained each year since then. The JTC recommends retaining this IMEG range for 2016, as per the intention of the Yukon River Panel to retain this objective for 2014–2016.

Canadian-origin Mainstem Yukon River Fall Chum Salmon

In 2010, the Panel adopted an IMEG range of 70,000–104,000 Canadian-origin mainstem Yukon River fall chum salmon. This range was developed as 0.8 to 1.2 times the estimated spawners at maximum sustained yield (86,600 fish), which was derived prior to the returns from the exceptional 2005 spawning escapement of over 437,000 fall chum salmon. Run size at the border has been assessed through the joint U.S./Canada sonar program near Eagle since 2006. For 2016, the JTC recommends that the Canadian-origin mainstem Yukon IMEG remain as established in 2010. The JTC escapement goal subcommittee will examine other data that may be used in recommending a revised escapement goal for future years, including genetic stock composition and age composition estimates for this stock, as it becomes available.

Fishing Branch River Fall Chum Salmon

In April 2008, the Yukon River Panel accepted the JTC recommendation for an IMEG range of 22,000–49,000 fall chum salmon for the Fishing Branch River for 2008–2010. This IMEG range was extended in 2010 for another 3 years, 2011–2013 (Appendix A23). Following consultation with the Yukon Salmon Subcommittee, the IMEG was subsequently adopted by DFO and included in the IFMP. In 2014, the JTC recommended extending the Fishing Branch IMEG range (22,000–49,000 fall chum salmon) for another 3 years, 2014–2016, so for 2016 the recommendation is simply to retain this goal.

11.2 ESCAPEMENT GOALS FOR ALASKA STOCKS

Yukon salmon escapement goals for all species in Alaska were reviewed in conjunction with the 2016 Alaska Board of Fisheries process for the Arctic, Yukon, and Kuskokwim (AYK) region (Conitz et al. 2015). The updated escapement goals were presented at the January 2016 Board of Fisheries meeting, and are expected to be approved by the directors of the ADF&G Divisions of Commercial Fisheries and Sport Fish later in the spring of 2016.

12.0 REFERENCES CITED

Andersen, D. B. 1992. The use of dog teams and the use of subsistence-caught fish for feeding sled dogs in the Yukon River drainage. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 210, Juneau.

Arnason, A. N., C. W. Kirby, C. J. Schwarz, and J. R. Irvine. 1995. Computer analysis of data from stratified mark-recovery experiments for estimation of salmon escapements and other populations. Canadian Technical Report of Fisheries and Aquatic Sciences 2106:37 p.

Berger, J. D. 2010. Incidental catches of salmonids by U.S. groundfish fisheries in the Bering Sea/Aleutian Islands and the Gulf of Alaska, 1990-2010. NPAFC Doc. 1254. 10 pp. Fisheries Monitoring and Analysis Division, Alaska Fisheries Science Center, NMFS, NOAA, U.S. Department of Commerce, 7600 Sand Point Way NE, Seattle, WA 98115-0070. Available at http://www.npafc.org

Bergstrom, D. J., C. Blaney, K. Schultz, R. Holder, G. Sandone, D. Schneiderhan, L. H. Barton, and D. Mesiar. 1992. Annual management report Yukon Area, 1990. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A92-17, Anchorage.

Brase, A. L. J., and B. Baker. 2012. Fishery management report for recreational fisheries in the Lower Tanana River management area, 2011. Alaska Department of Fish and Game, Fishery Management Report No. 12-46, Anchorage.

Burr, J. 2012. Fishery management report for sport fisheries in the Yukon Management Area, 2011. Alaska Department of Fish and Game, Fishery Management Report No. 12-44, Anchorage.

Carroll, H. C., R. D. Dunbar, and C. T. Pfisterer. 2007a. Evaluation of hydroacoustic site on the Yukon River near Eagle, Alaska for monitoring passage of salmon across the U.S./Canada Border. Alaska Department of Fish and Game, Fishery Data Series No. 07-10, Anchorage.

Carroll, H. C., R. D. Dunbar, and C. T. Pfisterer. 2007b. Sonar estimation of Chinook salmon in the Yukon River near Eagle, Alaska, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 07-84, Anchorage.

Conitz, J. M., K. G. Howard, and M. J. Evenson. 2015. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2016. Alaska Department of Fish and Game, Fishery Manuscript No. 15-08, Anchorage.

Crane, A. B., and R. D. Dunar. 2011. Sonar estimation of Chinook and fall chum salmon passage in the Yukon River near Eagle, Alaska, 2009. Alaska Department of Fish and Game, Fishery Data Series No.11-08, Anchorage.

Eggers, D. M. 2001. Biological escapement goals for Yukon River Fall chum salmon. Alaska Department of Fish and Game, Regional Information Report 3A01-10, Anchorage.

Estensen, J. L., S. N. Schmidt, S. Garcia, C. M Gleason, B. M. Borba, D. M. Jallen, A. J. Padilla, and K. M Hilton. 2015. Annual management report Yukon Area, 2014. Alaska Department of Fish and Game, Fishery Management Report No. 15-50, Anchorage.

Fleischman, S. J., and B. M. Borba. 2009. Escapement estimation, spawner-recruit analysis, and escapement goal recommendation for fall chum salmon in the Yukon River drainage. Alaska Department of Fish and Game, Fishery Manuscript Series No. 09-08, Anchorage.

Flannery B. G., T. D. Beacham, J. R. Candy, R. R. Holder, G. F. Maschmann, E. J. Kretschmer, J. K. Wenburg. 2010. Mixed-stock analysis of Yukon River chum salmon: application and validation in a complex fishery. North American Journal of Fisheries Management 30:1324-1338.

Flannery B. G., and J. K. Wenburg. 2015. Application of mixed-stock analysis for Yukon River chum salmon. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report for Study 10-205, Anchorage, Alaska.

Healey, M. C. 1991. Life history of Chinook salmon (*Oncorhynchus tshawytscha*). [*In*]: Groot, C. and L. Margolis, editors, Pacific Salmon Life Histories. UBC Press, Vancouver, B.C., Canada, pp. 311-394.

REFERENCES CITED (Continued)

Jallen, D. M., S. K. S. Decker, and T. Hamazaki. 2015. Subsistence and personal use salmon harvests in the Alaska portion of the Yukon River drainage, 2012. Alaska Department of Fish and Game, Fishery Data Series No. 15-28, Anchorage.

Lozori, J. D., and B. C. McIntosh. 2014. Sonar estimation of salmon passage in the Yukon River near Pilot Station, 2012. Alaska Department of Fish and Game, Fishery Data Series No. 14-22, Anchorage.

Murphy, J. M., W. D. Templin, E. V. Farley, Jr., and J. E. Seeb. 2009. Stock-structured distribution of western Alaska and Yukon juvenile Chinook salmon (*Onchorhynchus tshawytscha*) from United States BASIS surveys, 2002-2007. North Pacific Anadromous Fish Commission Bulletin 5:51-59.

NMFS (National Marine Fisheries Service). 2009a. Bering Sea salmon bycatch management volume I final environmental impact statement. National Marine Fisheries Service Alaska Regional Office, Juneau, AK, December 2009. Available at: http://www.fakr.noaa.gov/Sustainablefisheries/bycatch/salmon/chinook/feis/eis_1209.pdf

NMFS (National Marine Fisheries Service). 2009b. Bering Sea salmon bycatch management volume II final regulatory impact review. National Marine Fisheries Service Alaska Regional Office, Juneau, AK, December 2009. Available at: http://www.fakr.noaa.gov/Sustainablefisheries/bycatch/salmon/chinook/rir/rir1209.pdf

Salo, E. O. 1991 Life history of chum salmon, *Oncorhynchus keta*. [*In*]: Groot, C., and L. Margolis, editors. Pacific Salmon Life Histories. UBC Press, Vancouver, B.C., Canada, pp. 231-309.

FIGURES

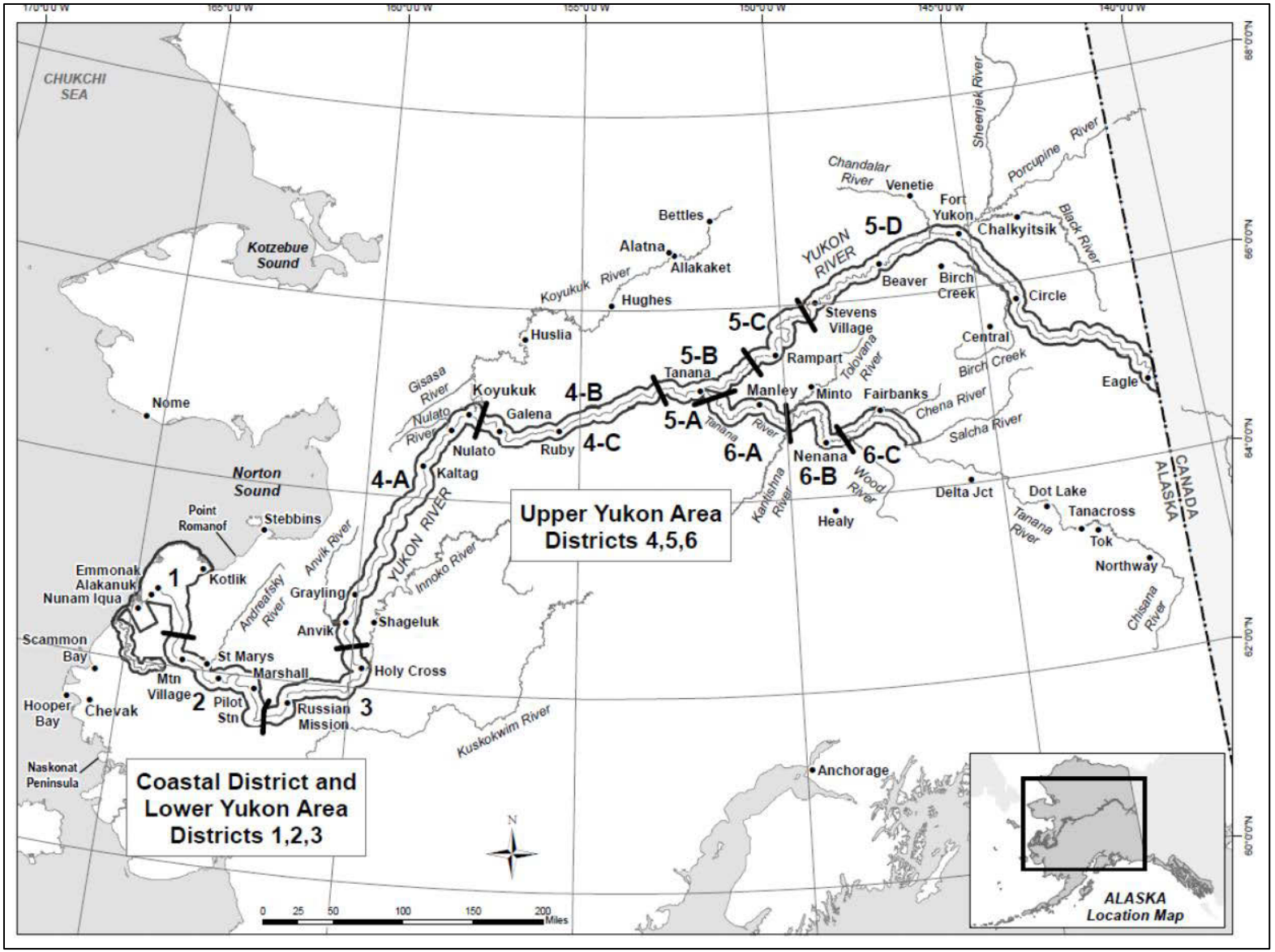
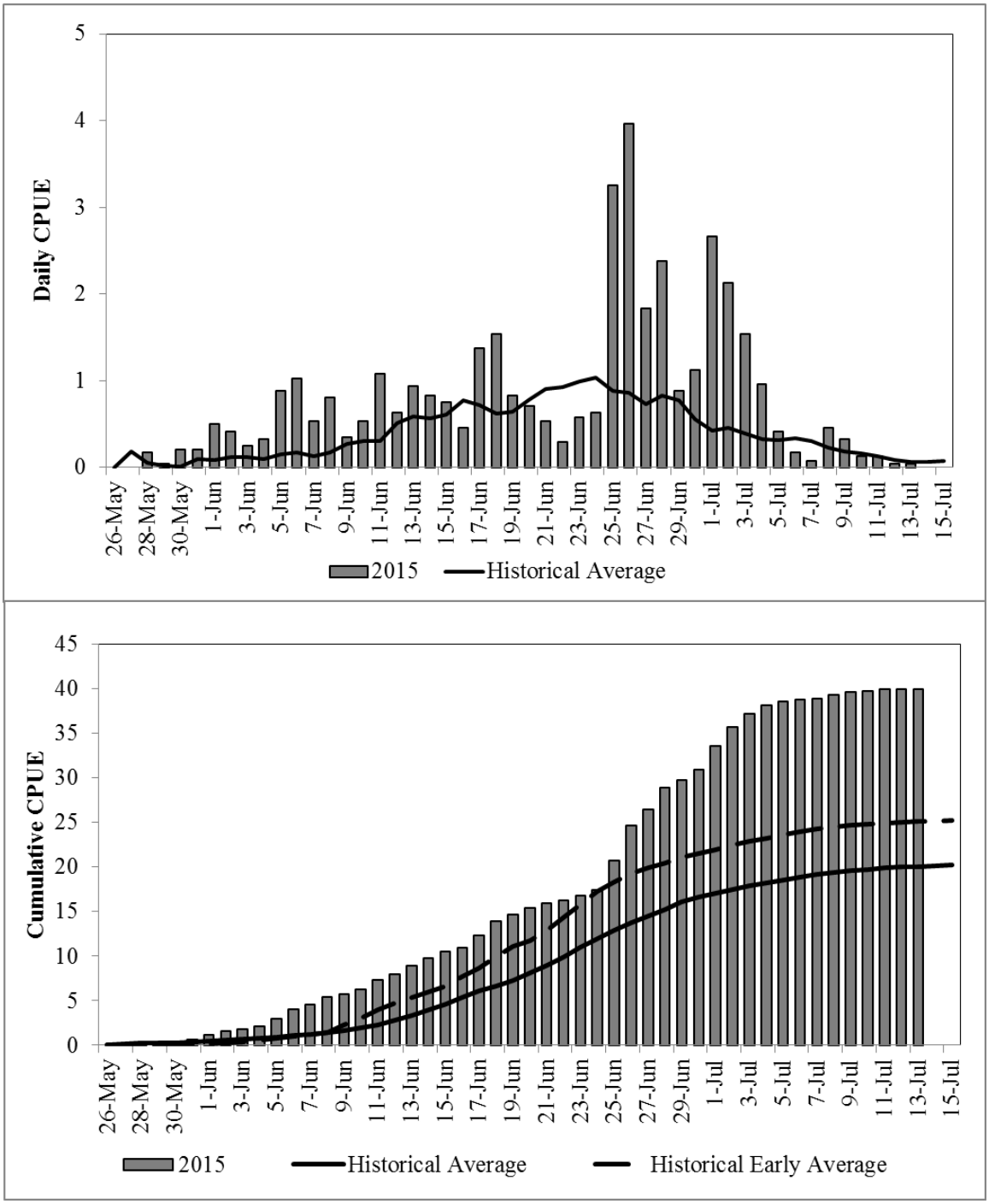
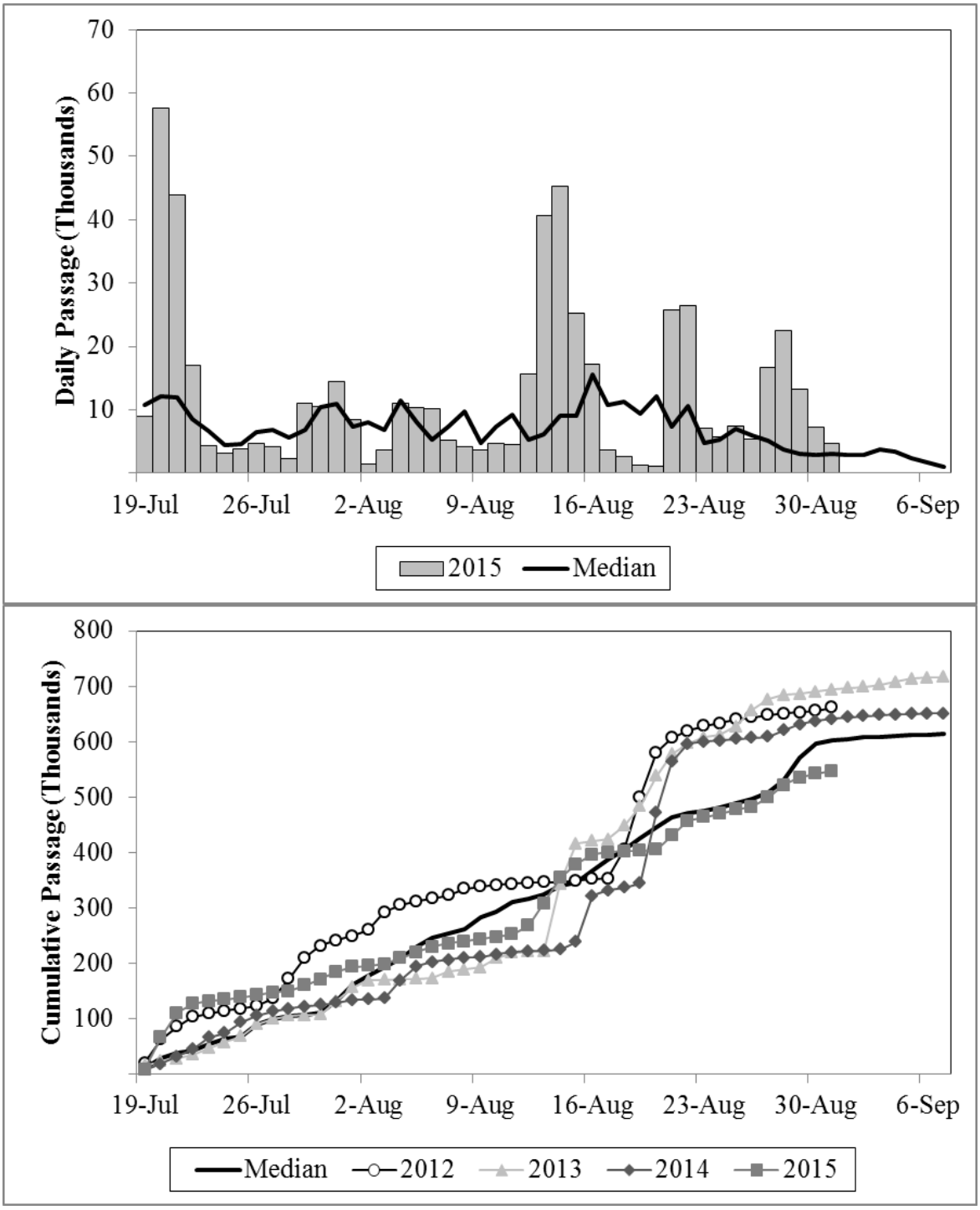


Figure 1.–Map of the Alaska portion of the Yukon River drainage showing communities and fishing districts.



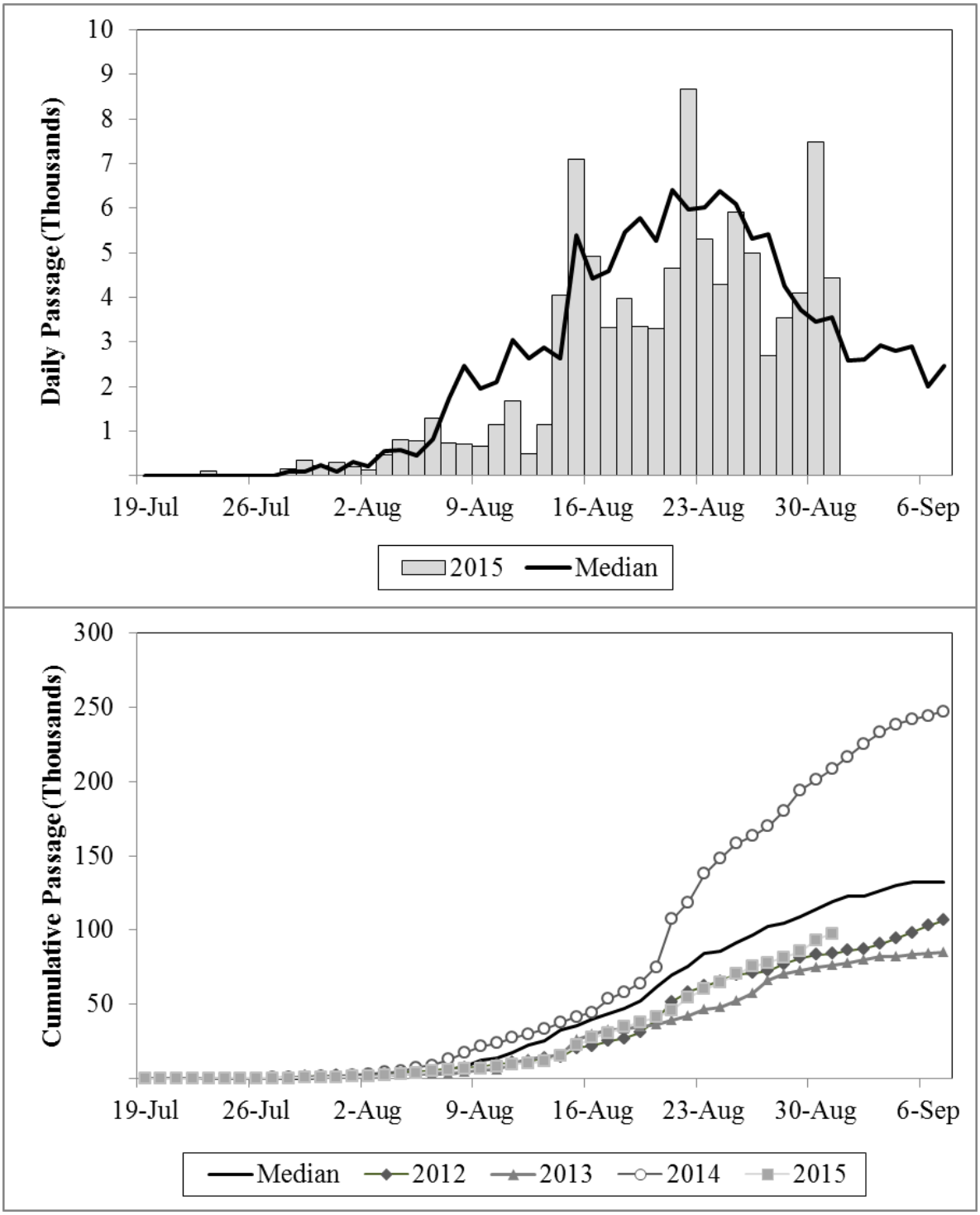
Note: Historical average includes 1989–2011, excluding 2009 and 2012–2014. Historical early average includes only 1993, 1995, 1996, 2003, and 2004.

Figure 2.–Daily (top) and cumulative (bottom) catch per unit effort (CPUE) for Chinook salmon in 8.5 inch set gillnet test fishery sites in 2015, compared to historic and early year average run timing, 1989–2014.



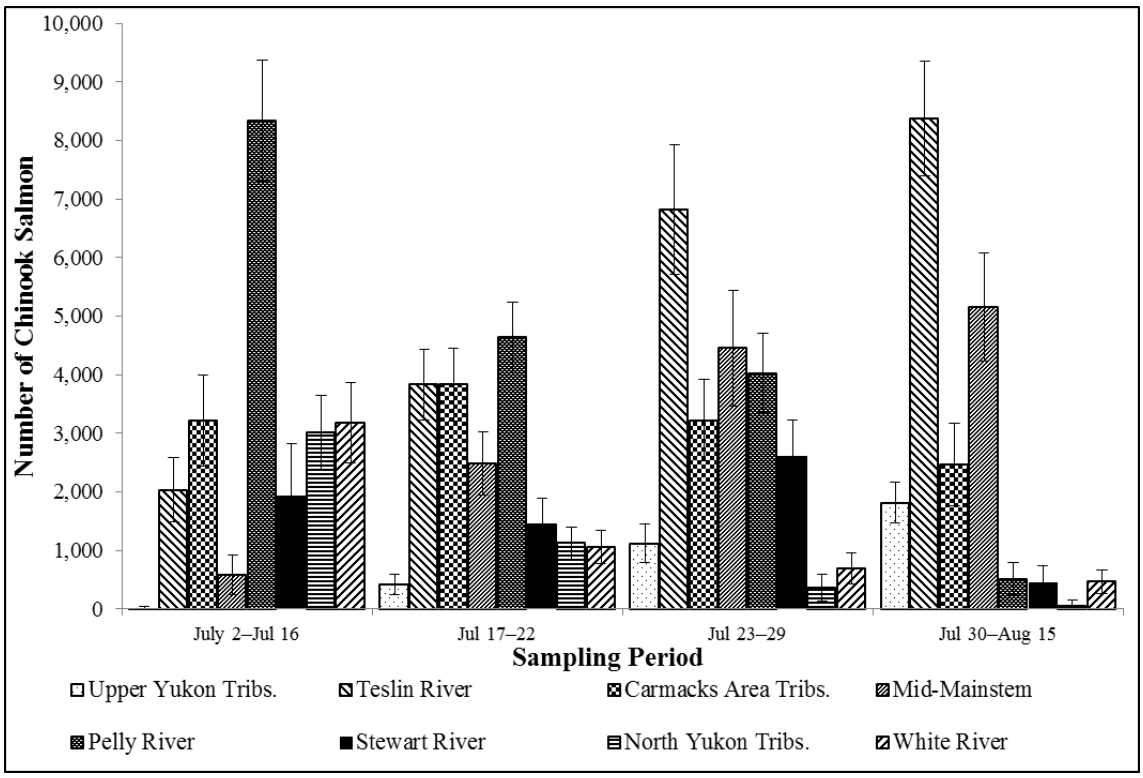
Note: Historical median includes 1995–2014, excluding 1996 and 2009.

Figure 3.–Daily passage estimates at the mainstem Yukon River sonar near Pilot Station attributed to fall chum salmon 2015 (top), compared to median and cumulative passage estimates (bottom), compared to other runs of similar size.



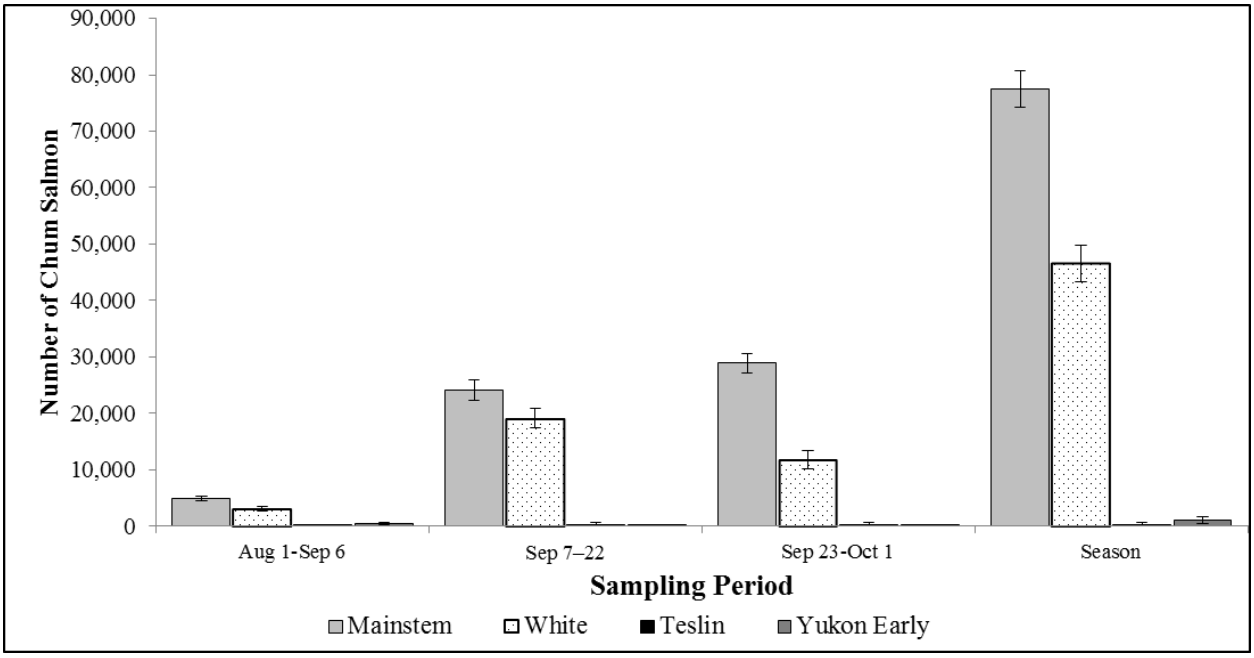
Note: Historical median includes 1995–2014, excluding 1996 and 2009.

Figure 4.–Daily passage estimates at the mainstem Yukon River sonar operated near Pilot Station attributed to coho salmon 2015 (top), compared to median and cumulative passage estimates (bottom), compared to median and other select years.



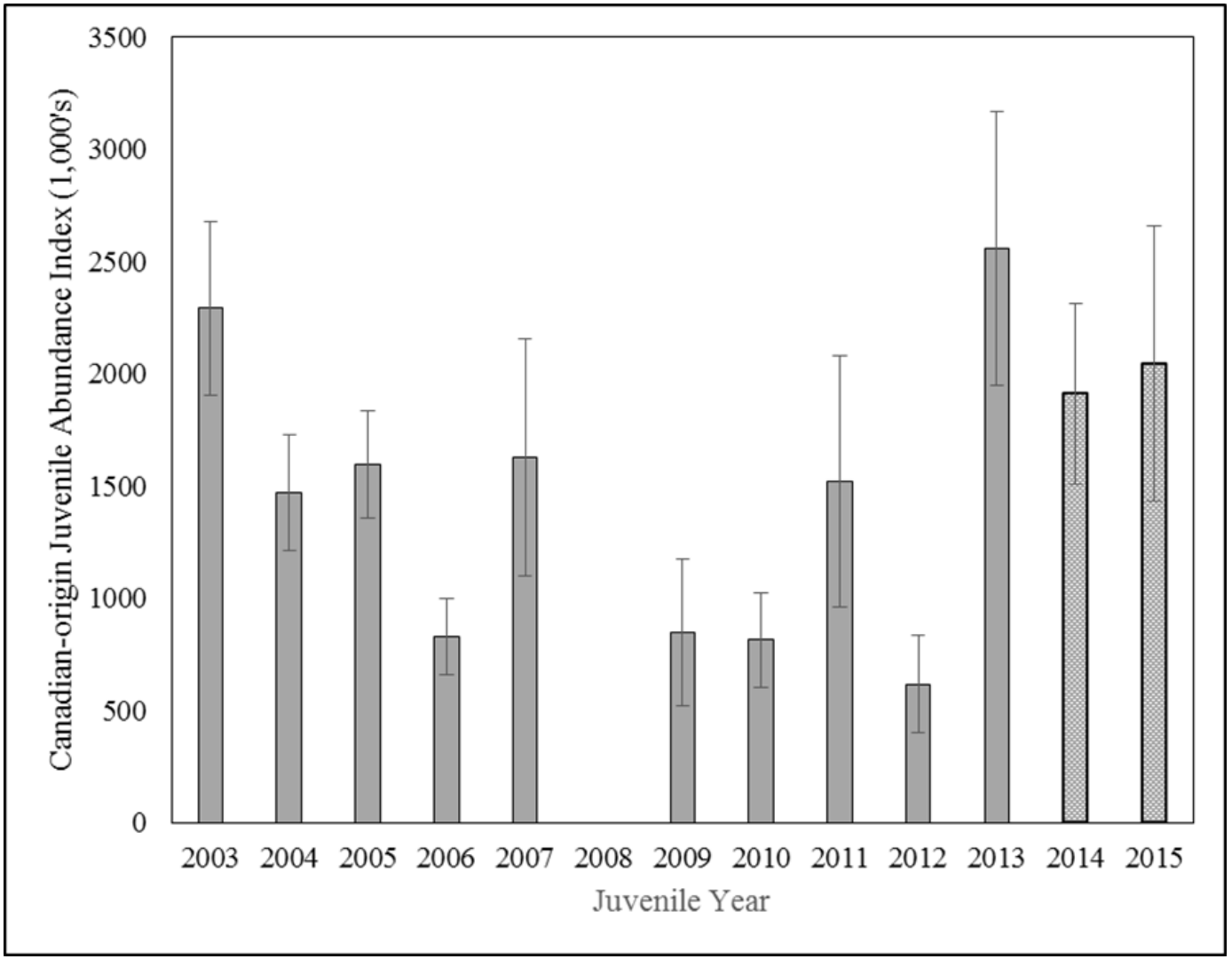
Note: This figure shows total seasonal abundance for 8 regional stock aggregates.

Figure 5.–Estimated abundance of upper Yukon Chinook salmon stocks at Eagle sonar site in 2015 determined by Genetic Stock Identification analyses.



Note: This figure shows the abundance for each sampling period as well as the seasonal estimate for 4 regional stock aggregates.

Figure 6.–Relative abundance of upper Yukon fall chum salmon stocks at Eagle sonar site in 2015 determined by Genetic Stock Identification analyses.



Note: Error bars identify the 80% confidence interval of the abundance estimates. The 2013–2015 estimates are preliminary and subject to change.

Figure 7.–Relative abundance of juvenile Chinook salmon estimated from catch rates in pelagic trawl research surveys in the northern Bering Sea (60N-65N).

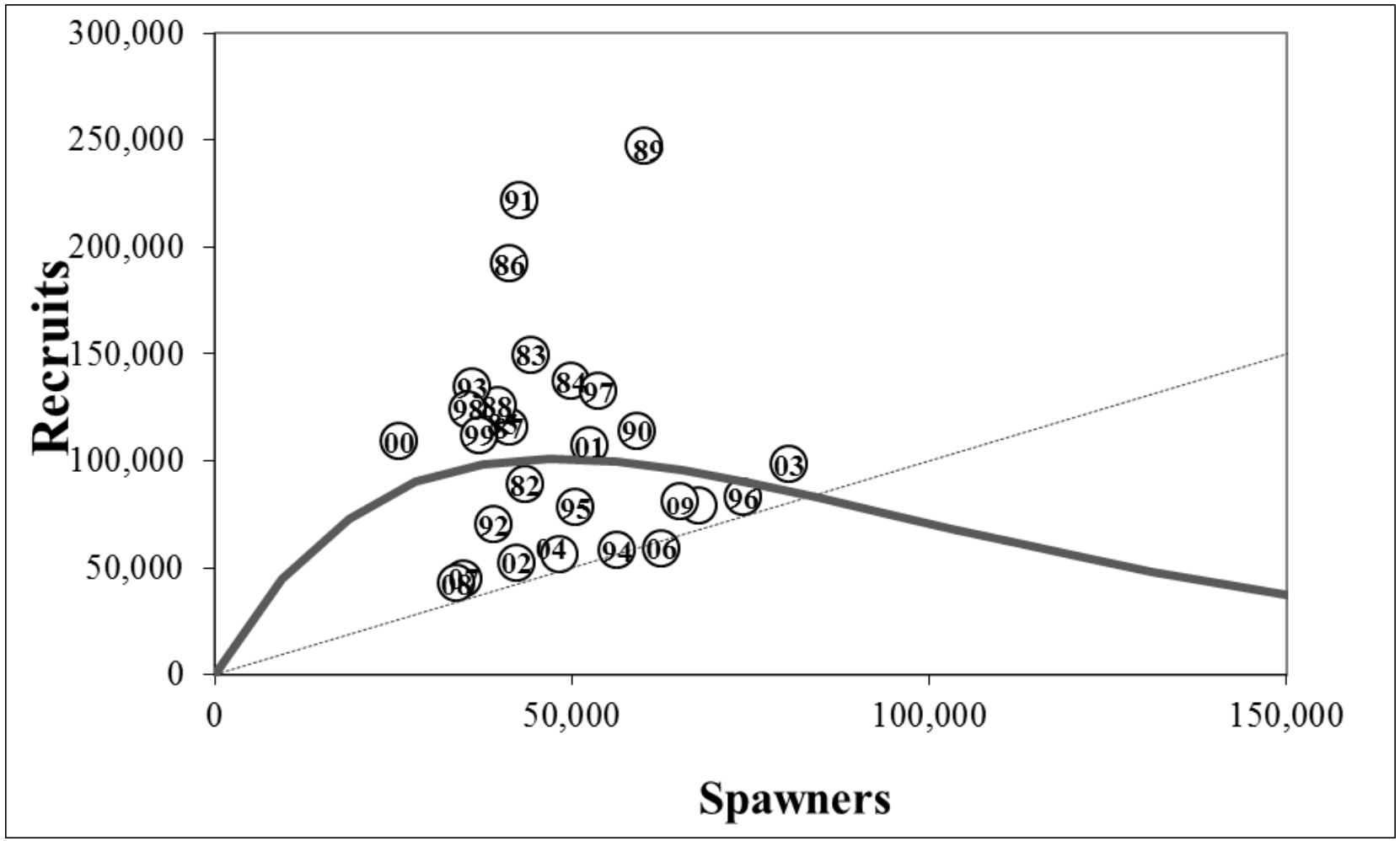
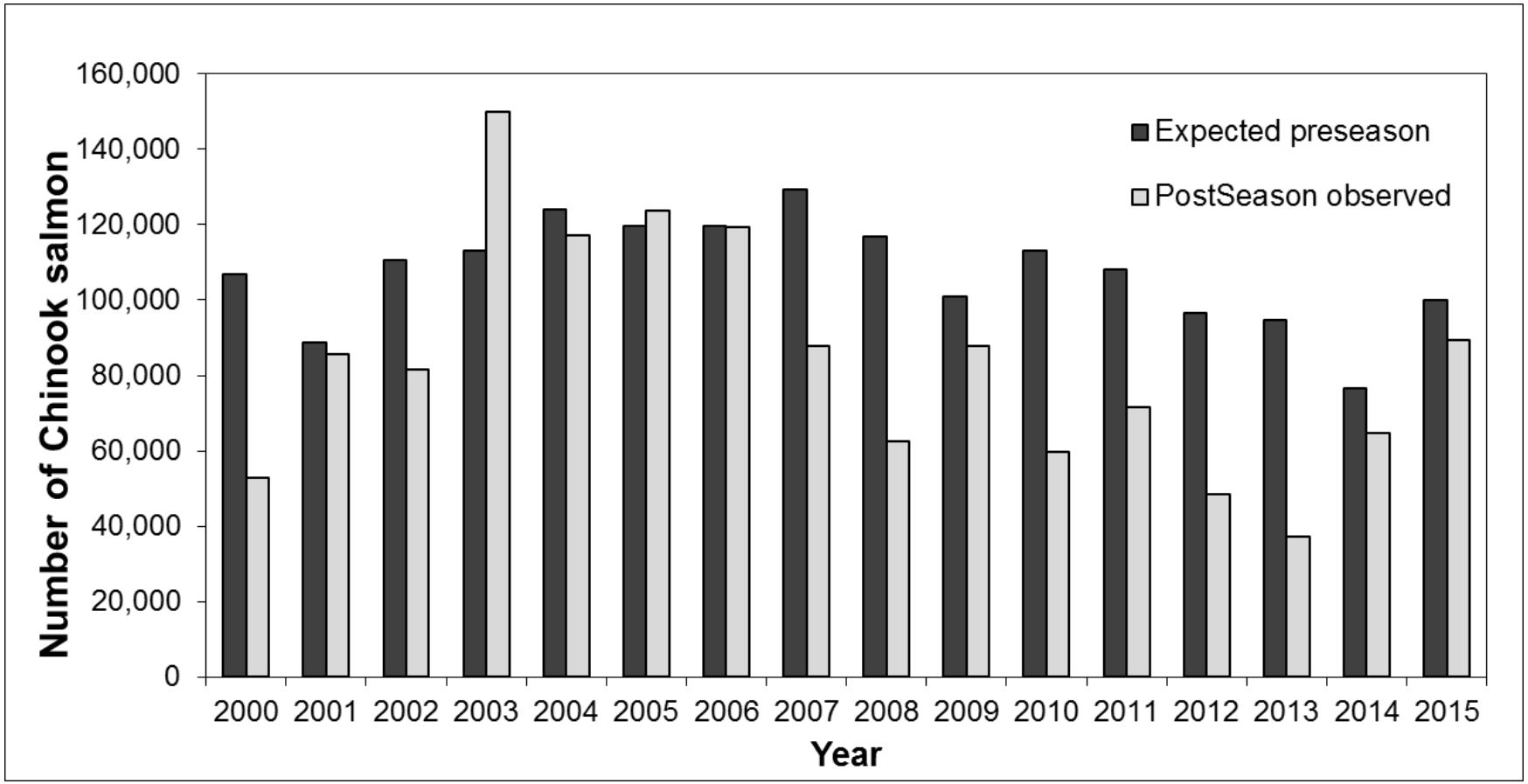


Figure 8.–Yukon River Canadian-origin Chinook salmon recruits versus spawners, Ricker curve, and 1:1 replacement line. Brood years 1982–2009 are included.



Note: The "expected" value is the average of the Spawner-Recruit and Sibling relationship-generated projections created preseason. Correction value based on model performance has not been applied to the "expected" values. The "observed" is estimated total Canadian-origin run size. This is calculated as the spawning escapement plus the U.S. harvest and the harvest in Canada.

Figure 9.–Expected versus observed number of Canadian-origin Chinook salmon returning to spawn, 2000–2015.

APPENDIX A: TABLES

Appendix A1.–Yukon River drainage summer chum salmon 2015 management plan overview.

	Recommended Management Actions			
Projected Run Size [a]	Commercial	Personal Use	Sport	Subsistence
600,000 or Less	Closure	Closure	Closure	Restrictions [b]
600,001 to 700,000	Closure	Closure	Closure	Possible Restrictions [b]
700,001 to 1,000,000	Restrictions [b]	Restrictions [b]	Restrictions [b]	Normal Fishing Schedules
900,001 to 1,000,000	0 – 50,000	Open	Open	Normal Fishing Schedules
Greater than 1,000,000 [c]	Open [d]	Open	Open	Normal Fishing Schedules

[a] ADF&G will use best available data including preseason projections, test fishing indices, age and sex composition, subsistence and commercial harvest reports, and passage estimates from escapement monitoring projects to assess the run.

[b] The fishery may be opened or less restrictive in areas where indicator(s) suggest the escapement goal(s) in that area will be achieved.

[c] Inriver run goal: This is a specific management objective for salmon stocks that are subject to harvest upstream of the point where escapement is estimate.

[d] ADF&G may open a drainagewide commercial fishery with the harvestable surplus distributed by district or subdistrict in proportion to the guideline harvest levels established in 5 AAC 05.362 (f) and (g) and 5 AAC 05.365 if buying capacity allows.

Appendix A2.–Passage estimates based on the mainstem Yukon River sonar near Pilot Station, Yukon River drainage, 1995 and 1997–2015.

	Chinook			Chum						
Year [a]	Large [b]	Small	Total	Summer	Fall [c]	Total	Coho [c]	Pink	Other [d]	Total
2015	86,620	29,464	116,084	1,385,083	546,894	1,931,977	97,587	22,421	1,254,634	3,422,703
2014	103,613	34,372	137,985	1,924,425	650,808	2,575,233	247,047	513,599	964,350	4,438,214
2013	105,433	11,726	117,159	2,747,218	716,727	3,463,945	84,795	4,624	1,029,900	4,700,423
2012	90,936	15,790	106,726	2,130,404	682,510	2,812,914	106,782	352,518	678,382	4,057,322
2011	100,217	23,152	123,369	1,977,808	764,194	2,742,002	124,931	6,526	694,700	3,691,528
2010	100,699	19,476	120,175	1,405,533	393,326	1,798,859	155,784	747,297	862,034	3,684,149
2009 [e]	108,361	35,688	144,049	1,421,646	233,307	1,654,953	206,620	23,679	765,140	2,794,441
2008	106,708	23,935	130,643	1,665,667	615,127	2,280,794	135,570	558,050	585,303	3,690,360
2007	90,184	35,369	125,553	1,726,885	684,011	2,410,896	173,289	71,699	1,085,316	3,866,753
2006	145,553	23,850	169,403	3,767,044	790,563	4,557,607	131,919	115,624	875,899	5,850,452
2005 [f]	142,007	17,434	159,441	2,439,616	1,813,589	4,253,205	184,718	37,932	593,248	5,228,544
2004	110,236	46,370	156,606	1,357,826	594,060	1,951,886	188,350	243,375	637,257	3,177,474
2003	245,037	23,500	268,537	1,168,518	889,778	2,058,296	269,081	4,656	502,878	3,103,448
2002	92,584	30,629	123,213	1,088,463	326,858	1,415,321	122,566	64,891	557,779	2,283,770
2001 [g]	85,511	13,892	99,403	441,450	376,182	817,632	137,769	665	353,431	1,408,900
2000	39,233	5,195	44,428	456,271	247,935	704,206	175,421	35,501	361,222	1,320,778
1999	127,809	16,914	144,723	973,708	379,493	1,353,201	62,521	1,801	465,515	2,027,761
1998	71,177	16,675	87,852	826,385	372,927	1,199,312	136,906	66,751	277,566	1,768,387
1997 [h]	118,121	77,526	195,647	1,415,641	506,621	1,922,262	104,343	2,379	621,857	2,846,488
1995	130,271	32,674	162,945	3,556,445	1,053,245	4,609,690	101,806	24,604	1,011,855	5,910,900

[a] Estimates for all years were generated with the most current apportionment model and may differ from earlier estimates.

[b] Chinook salmon >655 mm measured mideye to fork length .

[c] This estimate may not include the entire run. Most years previously operated through August 31, except 1995 (September 3), 1998 (September 9), 2000 (September 14) and 2008–2014 (September 7).

[d] Includes sockeye salmon, cisco, whitefish, sheefish, burbot, suckers, Dolly Varden, and northern pike.

[e] High water levels were experienced at Pilot Station in 2009 during the summer season and extreme low water occurred during the fall season, and therefore passage estimates are considered conservative.

[f] Estimates include extrapolations for the dates June 10 to June 18, 2005 to account for the time before the DIDSON was deployed.

[g] High water levels were experienced at Pilot Station in 2001 throughout the season, and therefore passage estimates are considered conservative.

[h] The Yukon River sonar project did not operate at full capacity in 1996 and there are no passage estimates for this year.

Appendix A3.–Alaska commercial salmon sales (in numbers) by district and subdistrict, 2015.

District/Subdistrict	Number of Fishermen [a]	Chinook	Summer Chum	Fall Chum	Coho	Pink
1	299	0	172,639	100,562	66,029	7,326
2	207	0	181,447	74,214	54,860	52
Subtotal Districts 1 and 2	480	0	354,086	174,776	120,889	7,378
3	–	–	–	–	–	–
Total Lower Yukon	480	0	354,086	174,776	120,889	7,378
Anvik River	–	–	–	–	–	–
4-A	–	–	–	–	–	–
4-BC	–	–	–	–	–	–
Subtotal District 4	–	–	–	–	–	–
5-ABC	1	–	–	1,048	0	–
5-D	–	–	–	–	–	–
Subtotal District 5	1	–	–	1,048	0	–
6-ABC	5	0	4,770	15,646	8,811	0
Total Upper Yukon	6	0	4,770	16,694	8,811	0
Total Alaska	486	0	358,856	191,470	129,700	7,378

Note: En dash indicates no commercial fishing activity occurred. Does not include ADF&G test fishery sales.

[a] Number of unique permits fished by district, subdistrict or area. Totals by area may not add up due to transfers between districts or subdistricts.

Appendix A4.–Number of commercial salmon fishing gear permit holders making at least one delivery by district and season, Yukon Area, 1990–2015.

Chinook and Summer Chum Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
1990	453	242	15	679	92	27	23	142	821
1991	489	253	27	678	85	32	22	139	817
1992	438	263	19	679	90	28	19	137	816
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	439	233	0	661	87	28	21	136	797
1996	448	189	9	627	87	23	15	125	752
1997	457	188	0	639	39	29	15	83	722
1998	434	231	0	643	0	18	10	28	671
1999	412	217	5	631	5	26	6	37	668
2000	350	214	0	562	0	0	0	0	562
2001 [a]	-	-	-	-	-	-	-	-	-
2002	322	223	0	540	0	18	6	24	564
2003	351	217	0	556	3	16	7	26	582
2004	396	212	0	549	0	14	6	20	569
2005	370	228	0	578	0	12	5	17	595
2006	379	214	6	569	0	15	10	25	594
2007	359	220	3	564	5	12	10	27	591
2008	266	181	0	444	8	0	5	13	457
2009	213	166	0	376	6	0	5	11	387
2010	264	181	0	440	5	0	5	10	450
2011	228	182	0	403	0	0	5	5	408
2012	242	178	0	413	11	0	3	14	427
2013	220	174	0	384	9	0	2	11	395
2014	231	183	0	405	10	0	1	11	416
2015	270	177	0	435	0	0	2	2	437
2005-2014 Average	277	191	1	458	5	4	5	14	472

-continued-

Fall Chum and Coho Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
1990	301	227	19	529	11	11	27	49	578
1991	319	238	19	540	8	21	25	54	594
1992	0	0	0	0	0	0	22	22	22
1993 [a]	-	-	-	-	-	-	-	-	-
1994	0	0	0	0	0	1	11	12	12
1995	189	172	0	357	4	12	20	36	393
1996	158	109	0	263	1	17	17	35	298
1997	176	130	0	304	3	8	0	11	315
1998	0	0	0	0	0	0	0	0	0
1999	146	110	0	254	4	0	0	4	258
2000 [a]	-	-	-	-	-	-	-	-	-
2001 [a]	-	-	-	-	-	-	-	-	-
2002 [a]	-	-	-	-	-	-	-	-	-
2003	75	0	0	75	2	0	5	7	82
2004	26	0	0	26	0	0	6	6	32
2005	177	0	0	177	0	0	7	7	184
2006	219	71	0	286	0	4	11	15	301
2007	181	122	0	300	0	2	8	10	310
2008	251	177	0	428	0	3	8	11	439
2009	165	130	0	292	0	0	2	2	294
2010	72	18	0	90	0	0	4	4	93
2011	234	169	0	395	0	2	5	7	402
2012	266	201	0	457	4	3	5	12	469
2013	251	197	0	436	0	1	6	7	443
2014	256	199	0	441	0	2	2	4	445
2015	266	184	0	440	0	1	5	6	446
2005-2014 Average	207	128	0	330	0	2	6	8	338

-continued-

COMBINED SEASON									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
1990	459	258	22	679	92	31	30	153	832
1991	497	272	29	680	85	33	28	146	826
1992	438	263	19	679	90	28	25	143	822
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	446	254	0	664	87	31	24	142	806
1996	455	217	9	628	87	29	19	135	763
1997	463	221	0	640	39	31	15	85	725
1998	434	231	0	643	0	18	10	28	671
1999	422	238	5	632	6	26	6	38	670
2000	349	214	0	561	0	0	0	0	561
2001 [a]	-	-	-	-	-	-	-	-	-
2002	322	223	0	540	0	18	6	24	564
2003	358	217	0	557	3	16	8	27	584
2004	399	212	0	551	0	14	9	23	574
2005	392	228	0	581	0	12	9	21	602
2006	396	224	6	574	0	20	16	36	610
2007	366	236	3	566	5	13	12	30	596
2008	297	208	0	474	8	3	11	22	496
2009	226	172	0	391	6	0	6	12	403
2010	274	183	0	444	5	0	6	11	455
2011	260	201	0	437	0	2	7	9	446
2012	284	210	0	475	11	3	5	19	494
2013	264	211	0	451	9	1	6	16	467
2014	277	216	0	468	10	2	2	14	482
2015	299	207	0	480	0	1	5	6	486
2005-2014 Average	304	209	1	486	5	6	8	19	505

Note: Subtotals and combined season (summer and fall) totals are not additive since fishermen may have operated in more than one district during the year. The table represents the number of permit holders which made at least one delivery.

[a] No commercial salmon fishery was conducted the entire season in 2001.

Appendix A5.–Yukon River drainage fall chum salmon management plan overview, 5 AAC 01.249, for 2016.

Run Size Estimate [b] (Point Estimate)	Recommended Management Action [a] Fall Chum Salmon Directed Fisheries				Targeted Drainagewide Escapement
	Commercial	Personal Use	Sport	Subsistence	
300,000 or Less	Closure	Closure	Closure	Closure [c]	300,000
300,001 to 500,000	Closure	Closure [c]	Closure [c]	Possible Restrictions [c, d]	to
Greater Than 500,001	Open [e]	Open	Open	Pre-2001 Fishing Schedules	600,000

[a] Considerations for the Canadian mainstem rebuilding plans may require more restrictive management actions.

[b] ADF&G will use the best available data, including preseason projections, mainstem river sonar passage estimates, test fisheries indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects.

[c] The fisheries may be opened or less restrictive in areas where indicator(s) suggest the escapement goal(s) in that area will be achieved.

[d] Subsistence fishing will be managed to achieve a minimum drainagewide escapement goal of 300,000 fall chum salmon.

[e] Drainagewide commercial fisheries may be open and the harvestable surplus above 550,000 fall chum salmon will be distributed by district or subdistrict (in proportion to the guidelines harvest levels established in 5 AAC 05.365 and 5 AAC 05.367).

Appendix A6.–Canadian weekly commercial catches of Chinook, fall chum and coho salmon in the Yukon River in 2015.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number of Fishermen	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
28	11-Jul	5-Jul	11-Jul	closed					
29	18-Jul	12-Jul	18-Jul	closed					
30	25-Jul	19-Jul	25-Jul	closed					
31	1-Aug	26-Jul	1-Aug	closed					
32	8-Aug	2-Aug	8-Aug	closed					
33	15-Aug	9-Aug	15-Aug	closed					
34	22-Aug	16-Aug	22-Aug	closed					
35	29-Aug	23-Aug	29-Aug	2	1.0	2	0	19	
36	5-Sep	30-Aug	5-Sep	6	0.8	5	0	34	
37	12-Sep	6-Sep	12-Sep	7	1.7	12	0	536	
38	19-Sep	13-Sep	19-Sep	7	2.3	16	0	611	
39	26-Sep	20-Sep	26-Sep	7	1.1	8	0	705	
40	3-Oct	27-Sep	3-Oct	7	0.6	4	0	491	
41	10-Oct	4-Oct	10-Oct	7	0.4	3	0	373	
42	17-Oct	11-Oct	17-Oct	7	0.0	0	0	93	
43	24-Oct	18-Oct	24-Oct	4	0.1	1	0	0	
Dawson Area Commercial				54		50.6	0	2,862	0
Upriver Commercial							0	0	0
Total Commercial Harvest							0	2,862	0
Domestic							0	35	0
Recreational							0	0	0
Aboriginal Fishery							1,000 [a]	1,000 [a]	0
Total Upper Yukon Harvest							1,000	3,897	0
Old Crow Aboriginal Fishery							204	556	0
Total Canada Harvest							1,204	4,453	0

Note: Number of fishermen = Average number of fishermen over days open.

[a] Data are preliminary.

Appendix A7.–Salmon fishery projects conducted in the Alaska portion of the Yukon River drainage in 2015.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaska portion of the Yukon River drainage	1) Document and estimate the catch and associated effort of the Alaska Yukon River and; 2) Commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon.	June-Oct.	ADF&G	All aspects
Commercial Catch Sampling and Monitoring	Alaska portion of the Yukon River drainage	1) Determine age, sex and size of Chinook, chum and coho salmon harvested in Alaska Yukon River commercial fisheries and; 2) Monitor Alaska commercial fishery openings and closures.	June-Oct.	ADF&G, ADPS	All aspects Enforcement
Subsistence and Personal Use Catch and Effort Assessment	Alaska portion of the Yukon River drainage	Document and estimate the catch and associated effort of the Alaska Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits, and of the personal use fishery based on fishery permits.	Ongoing	ADF&G, YRDFA	All aspects Assistants in Communities
Sport Catch, Harvest and Effort Assessment	Alaska portion of the Yukon River drainage	Document and estimate the catch, harvest, and associated effort of the Alaska Yukon River sport fishery via postseaon mail-out questionnaires.	Postseason	ADF&G	All aspects
Biological Sampling of Yukon River Salmon	Yukon, RM 17-1,002	Collect genetics samples and age, sex, and length information from subsistence caught Chinook salmon.	June - Aug	Spearfish Research	All aspects
Yukon River Chinook Microsatellite Baseline	Yukon River drainage	Survey standardized microsatellites and Yukon River Chinook salmon both U.S. and Canada populations.	Ongoing	ADF&G, USFWS, DFO	TI Funding R&E Funding
Yukon River Salmon Stock Identification	Yukon River drainage	Estimate Chinook salmon stock composition of the various Yukon River drainage harvests through genetic stock identification, age compositions, and geographical distribution of catches and escapements.	Ongoing	ADF&G	All aspects TI Funding
Yukon Delta Smolt	Yukon Delta (mouths and delta platform)	1) Describe catch rates and distribution of juvenile Chinook; update juvenile life-history information on size and timing of marine entry. 2) Describe fish communities in Yukon Delta tributary, tidal channel, and delta front/prodelta habitats and investigate prey consumption by potential juvenile salmon competitors and predators. 3) Describe temporal and spatial patterns in juvenile Chinook nutritional status.	May-August	ADF&G NOAA-AFSC	All aspects

-continued-

Appendix A7.–Page 2 of 5.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Local and Traditional Knowledge (LTK) of Freshwater Aspects of Chinook Salmon Life Cycle, Yukon River	St. Marys, Anvik, Huslia, Allakaket, and Fort Yukon	1) Identify and map the specific fresh-water habitat areas where local residents have personal experience through fishing or other activities;2) Conduct in-depth ethnographic interviews to document LTK of these areas regarding such factors as spawning density and behavior, water quality, migratory access; 3) Compare ethnographic data to results of area enumeration projects for potential correlation; 4) Consult the Anadromous Waters Catalog regarding identified areas and compare with results of key respondent interviews/maps.	December 2013 – June 2016	ADF&G	All aspects
Patterns and Trends in Subsistence Salmon Fishing on the Yukon River	Alakanuk, Marshall, Nulato, Galena, Beaver, and Eagle.	1) Compare community and household harvest databases; conduct quality and control assessment; 2) Analyze the databases to identify harvest patterns and trends that influence harvest activities for 3 salmon species (Chinook, summer chum and fall chum salmon) in 6 communities.	December 2013 – January 2017	ADF&G, APU	All aspects. APU statistical analysis macro-level patterns
Yukon River Chum Salmon Mixed-Stock Analysis	Pilot Station, RM 123	Estimate the stock compositions of chum salmon using samples collected from Pilot Station sonar test fisheries.	May – Aug.	USFWS	All aspects TI Funding summer, OSM Funding -fall
YRDFA Weekly Teleconferences	Yukon River drainage	Acts as a forum for fishermen along the Yukon River to interact with state and federal managers for the collection and dissemination of fisheries information.	May – Sept.	YRDFA	All aspects R&M Funding
Lower Yukon River Set Gillnet Test Fishing	South, Middle, and North mouths of the Yukon River Delta, RM 20	1) Index Chinook salmon run timing and abundance using set gillnets and; 2) Sample captured salmon for age, sex, size composition information.	June – Aug.	ADF&G, YDFDA	All aspects
Lower Yukon River Drift Test Fishing	South, Middle, and North mouths of the Yukon River Delta, RM 20	1 Index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets and; 2) Sample captured salmon for age, sex, size composition information.	June – Aug.	ADF&G, YDFDA	All aspects
Mountain Village Drift Gillnet Test Fishing	Mainstem Yukon River, RM 87	1) Index fall chum and coho salmon run timing and relative abundance using drift gillnets and; 2) Sample captured salmon for age, sex, size composition information.	July – Sept.	Sandone Consulting LLC, ATC, ADF&G	All aspects R&E funding
East Fork Weir, Andreafsky River	RM 20 East Fork, Yukon RM 124	Estimate daily escapement, with age, sex and size composition, of Chinook and summer chum salmon into the East Fork of the Andreafsky River.	June – Aug.	USFWS	All aspects OSM Funding

-continued-

Appendix A7.–Page 3 of 5.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Anvik River Sonar	RM 40 Anvik River, Yukon RM 358	1) Estimate daily escapement of summer chum salmon to the Anvik River and; 2) Estimate age, sex, and size composition of the summer chum salmon escapement.	June – July	ADF&G	All aspects OSM Funding
Inseason Monitoring of Subsistence Salmon Harvests	Marshall, Yukon RM 161	Collected inseason data by conducting door-to-door salmon harvest surveys during the fishing season with reference to: 1) local research assistant capacity with staff oversight; 2) financial costs; 3) community response; provide regular updates to managers; and 4) currently producing report outlining results.	May – Jan.	ADF&G	All aspects
Yukon River Sonar	Pilot Station, RM 123	Estimate Chinook and summer and fall chum salmon passage in the mainstem Yukon River. Apportionment of species including coho salmon and other finfish.	May – Sept.	ADF&G	All aspects
Gisasa River Weir	RM 3 Gisasa River, Koyukuk River drainage, RM 567	1) Estimate daily escapement of Chinook and summer chum salmon into the Gisasa River and; 2) Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June – Aug.	USFWS	All aspects OSM Funding
Henshaw Creek Weir	RM 1 Henshaw Creek, Koyukuk River drainage, RM 976	1) Estimate daily escapement of Chinook and summer chum salmon into Henshaw Creek and; 2) Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June – Aug.	TCC, USFWS-OSM	All aspects oversight & funding report write-up
Chandalar River Sonar	RM 14 Chandalar River, Yukon RM 996	1) Estimate fall chum salmon passage using DIDSON sonar in the Chandalar River.	Aug. – Sept.	USFWS	All aspects TI Funding
Yukon River Sonar	Eagle, RM 1,213	1) Estimate daily passage of Chinook and chum salmon in the mainstem Yukon River using both split-beam and DIDSON and; 2) Estimate age, sex, and size composition of salmon captured in the test nets.	July – Oct.	ADF&G, DFO	All aspects, technical support, TI Funding, R&E Funding
Rapids Test Fish Wheel	Mainstem Yukon River, RM 730	1) Index run timing of Chinook and fall chum salmon runs as well as non-salmon species using video monitoring techniques and; 2) Characterize the sex, weight, and girth composition of Chinook salmon.	June – Sept.	Zuray USFWS	All aspects R&E funding
Tanana River Sonar	Mainstem Tanana River, RM 765	1) Estimate daily passage of Chinook, chum and coho salmon in the mainstem Tanana River using both split-beam and DIDSON and; 2) Estimate age, sex, and size composition of salmon captured in the test nets and fish wheel. Feasibility year.	Jul. – Sept.	ADF&G	All aspects

-continued-

Appendix A7.–Page 4 of 5.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Nenana River Escapement Surveys	Nenana River drainage, RM 860	Aerial surveys for numbers and distribution of coho and chum salmon in 10 tributaries of the Nenana River below Healy Creek.	Sept. – Oct.	ADF&G	All aspects
Delta River Ground Surveys	Tanana River drainage RM 1,031	1) Estimate fall chum salmon spawning escapement in Delta River and; 2) Sample fall chum salmon carcasses for age, sex, and size composition information.	Oct. – Dec.	ADF&G	All aspects
Chena River Tower	RM 45 Chena River, Tanana River drainage, RM 921	Estimate daily escapement of Chinook and summer chum salmon into the Chena River.	July – Aug.	ADF&G	All aspects AYKSSF Funding
Salcha River Tower	RM 4 Salcha River, Tanana River drainage, RM 967	Estimate daily escapement of Chinook and summer chum salmon into the Salcha River.	July – Aug.	BSFA	All aspects R&M Funding
Upper Tanana Escapement Surveys	Tanana River drainage, RM 991-1,053	Aerial and boat surveys for numbers and distribution of chum and coho salmon in the side sloughs and tributaries of the Tanana River drainage.	Nov.	ADF&G	All aspects
Goodpaster River Tower	RM 45 Goodpaster River, Tanana River drainage, RM 1,049	Estimate daily escapement of Chinook and summer chum salmon into the Goodpaster River.	July – Aug.	BSFA	All aspects Pogo Mine funding
Upper Yukon River Chum Salmon Genetic Stock Identification	Yukon River drainage	Establish the feasibility of using DNA markers for genetic stock identification of chum salmon in the Yukon River.	June – Oct.	USFWS	All aspects
Yukon River Inseason Salmon Harvest Interviews	Alakanuk, Marshall, Russian Mission, Holy Cross, Kaltag, Huslia, Galena, Nenana, Ft. Yukon and Eagle	Collect qualitative inseason subsistence salmon harvest information through weekly interviews.	June – Sept.	YRDFA, USFWS	All aspects OSM funding
Migratory Timing and Harvest Information of Chinook Salmon Stocks	Yukon River drainage	Enlarge existing allozyme and develop a DNA database to characterize the genetic diversity of Chinook salmon in the Yukon River within the U.S. and Canada. U.S. collections include microsatellites and allozyme. Canadian collections include microsatellites.	June – Aug.	USFWS-OSM, ADF&G, DFO	All aspects
In-river coded-wire-tag (CWT) recovery (Whitehorse Hatchery tags)	Yukon River drainage	Collection of Chinook salmon heads from all operating project that are marked with no adipose fin and send to lab to extract data tag. (Appendix A17)	May-Sept	ADF&G	Decoding

-continued-

Acronyms:

ADF&G	= Alaska Department of Fish and Game
ADPS	= Alaska Department of Public Safety
AFSC	= Alaska Fisheries Science Center
APU	= Alaska Pacific University
ATC	= Asacarsarmiut Tribal Council
AVCP	= Association of Village Council Presidents, Inc.
AYKSSF	= Arctic-Yukon-Kuskokwim Sustainable Salmon Fund
BSFA	= Bering Sea Fishermen's Association
DFO	= Department of Fisheries and Oceans (Canada)
DNA	= Deoxyribonucleic acid
NOAA	= National Oceanic and Atmospheric Association
OSM	= Office of Subsistence Management
R&E	=Yukon River Panel Restoration and Enhancement Program
R&M	=Research and Management Fund
TCC	= Tanana Chiefs Conference, Inc.
USFWS	= United States Fish and Wildlife Service
USFWS-OSM	= United States Fish and Wildlife Service, Office of Subsistence Management
YDFDA	=Yukon Delta Fisheries Development Association
YRDFA	= Yukon River Drainage Fisheries Association

Appendix A8.–List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2015.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Aboriginal Catch Monitoring	Yukon communities	1) To determine weekly catches and effort in the aboriginal fishery, and; 2) To implement components of the UFA and AFS.	July – Oct.	YFN's DFO	Joint Project
Recreational Catch Monitoring	Yukon River mainstem and tributaries	1) To determine the recreational harvest by species including the date, sex, whether released or retained, and fishing location, and; 2) Salmon caught are reported through the YSCCC program.	July – Oct.	DFO	All aspects
Commercial Catch Monitoring	Yukon River mainstem	1) To determine weekly catches and effort in the Canadian commercial fishery (Chinook and chum) and; 2) to collect other information as required.	July – Oct.	DFO	All aspects
Escapement Surveys and Biological Sampling	Throughout upper Yukon River drainage	1) To conduct surveys of spawning fish by foot, boat, air etc.; 2) To collect ASL and genetic tissue samples from spawning population, and; 3) To count and recover tags in terminal areas.	July – Oct.	R&E Projects DFO YFNs AFS	All aspects
Porcupine River Chum Salmon Radio Tagging and Telemetry	Porcupine River and tributaries (Including Fishing Branch) upstream of Old Crow.	1) To estimate the percent of Porcupine River chum salmon spawning upstream of the Fishing Branch weir site, to allow comparison of Old Crow hydroacoustic estimates to historic weir counts; and 2) To identify chum spawning locations in the Porcupine River upstream of Old Crow.	Aug. – Oct.	VGFN & EDI	Joint Project
Porcupine River Sonar - Chinook	Old Crow	1) Installation and operation of 2 ARIS sonars to 1) estimate Chinook salmon daily passage, and 2) conduct biological sampling for species apportionment, age, sex and length.	Aug. – Oct.	EDI & VGFN	All aspects
Porcupine River Sonar - Chum	Old Crow	1) Operation of 2 ARIS sonars to 1) estimate chum salmon daily passage, and 2) conduct biological sampling for species apportionment, age, sex and length.	Aug. – Oct.	DFO	All aspects
Whitehorse Rapids Fishway	Whitehorse	1) To enumerate wild and hatchery reared Chinook salmon returns to the Whitehorse Fishway area and; 2) obtain age, size, sex and tag data.	July – Aug.	YF&GA	All aspects
Blind Creek Weir	Pelly River	1) To enumerate Chinook salmon escapement, recover tags and; 2) collect ASL data and DNA samples.	July – Aug.	JW&A	All aspects
Big Salmon Sonar	Big Salmon River	1) Installation and operation of a DIDSON sonar program for enumeration of Chinook salmon providing daily passage, and; 2) obtain carcass survey, ASL, and genetic samples.	July – Aug.	Metla Env. Inc. & JW&A	All aspects

-continued-

Appendix A8.–Page 2 of 2.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Teslin River Sonar	Teslin River	Installation and operation of a DIDSON sonar program for Chinook salmon enumeration.	July – Oct.	Metla Env. Inc.	All aspects
Whitehorse Rapids Fish Hatchery and Coded-Wire Tagging Project	Whitehorse	1) To rear and release ~150K Chinook salmon fry produced from Whitehorse Rapids Fishway broodstock, and; 2) To mark fry with a CWT, adipose clip, and release upstream of the Whitehorse hydroelectric facility.	Ongoing	GY and YEC, YF&GA	All aspects Coded-wire tagging
McIntyre Incubation Facility and Coded-Wired Tagging Project	Whitehorse	1) To incubate up to 120K Chinook salmon eggs from brood stock collected in Yukon River spawning tributaries, and/or the Whitehorse Rapids Fishway, and; 2) To rear, mark with CWT, adipose clip, and release fry to natal streams and/or restoration sites.	Ongoing	YC, YEC, TKC, DFO	Field work, project monitoring, technical support
Fox Creek Restoration Program	Whitehorse Area	Rear, tag and release Whitehorse Rapids Chinook salmon fry in Fox Creek.	Ongoing	TKC	All aspects
Big Salmon River Juvenile Chinook Assessment	Big Salmon River	1) Operation of Rotary Screw Trap, Gee minnow traps and seine nets to capture juvenile Chinook salmon and use CPUE and mark-recapture to initiate development of an abundance index 2) sample juvenile chinook salmon to monitor change in size through the season.	May – Aug.	DFO & Metla Env. Inc.	All aspects

Acronyms:

ASL = Age Sex Length- term that refers to the collection of biological information.
AFS = Aboriginal Fisheries Strategy
BM&A = B. Mercer and Associates
CWT = Coded Wire Tag
DFO = Department of Fisheries and Oceans Canada
DNA = Deoxyribonucleic acid
EDI = Environmental Dynamics Incorporated
GY = Government of Yukon-Environment Yukon
JW&A = Jane Wilson & Associates
Metla Env. Inc = Metla Environmental Incorporated
TKC = Ta'an Kwa'chin Council
UFA = Umbrella Final Agreement
YC = Yukon College
YEC = Yukon Energy Corporation
YFN's = Yukon First Nations
YF&GA = Yukon Fish and Game Association
YSCCC = Yukon Salmon Conservation Catch Card
VGFN = Vuntut Gwitchin First Nation

Appendix A9.–Yukon River Canadian-origin Chinook salmon total run by brood year and escapement by year.

Brood	Age								
Year	3	4	5	6	7	8	Return	Spawners	R/S
74						634			
75					33,080	175			
76				88,405	22,026	40			
77			19,491	111,771	19,734	801	151,797		
78		4,443	22,845	63,235	29,424	1,493	121,439		
79	1,534	3,388	21,422	100,503	48,253	1,175	176,274		
80	15	6,604	13,510	70,415	33,978	4,240	128,763		
81	0	1,122	33,220	114,180	54,845	1,841	205,208		
82	0	5,141	17,169	37,883	27,763	376	88,330	43,538	2.03
83	560	7,558	35,117	89,449	16,408	162	149,253	44,475	3.36
84	69	13,368	34,379	75,041	13,782	138	136,778	50,005	2.74
85	223	10,738	38,956	62,142	4,756	91	116,906	40,435	2.89
86	347	20,408	45,928	109,067	15,843	138	191,731	41,425	4.63
87	0	2,368	33,542	67,697	11,700	18	115,325	41,307	2.79
88	0	6,641	34,323	75,396	8,937	68	125,366	39,699	3.16
89	75	13,517	78,826	128,851	25,841	0	247,109	60,299	4.10
90	56	6,343	24,873	71,641	10,816	9	113,737	59,212	1.92
91	501	7,107	82,332	121,590	10,182	0	221,712	42,728	5.19
92	6	2,608	23,981	41,677	1,831	0	70,103	39,155	1.79
93	14	5,313	36,363	86,880	5,880	0	134,450	36,244	3.71
94	0	755	19,932	30,683	6,175	0	57,545	56,449	1.02
95	34	1,784	15,989	52,720	7,026	10	77,562	50,673	1.53
96	20	276	23,201	44,462	14,610	2	82,571	74,060	1.11
97	14	3,567	26,386	94,406	7,828	14	132,216	53,821	2.46
98	0	3,478	39,260	76,502	4,357	0	123,598	35,497	3.48
99	134	1,692	30,110	76,649	2,870	0	111,455	37,184	3.00
00	0	2,798	40,704	63,414	1,509	0	108,424	25,870	4.19
01	8	1,813	50,877	51,785	2,205	0	106,688	52,564	2.03
02	75	2,262	28,704	20,725	227	9	52,003	42,359	1.23
03	63	5,898	37,236	52,339	2,261	2	97,798	80,594	1.21
04	3	2,462	26,833	21,936	4,777	1	56,012	48,469	1.16
05	9	8,268	29,475	38,857	1,754	0	78,362	67,985	1.15
06	15	6,008	25,245	25,683	1,568	0	58,519	62,630	0.93
07	47	2,855	17,746	22,193	1,705	0	44,545	34,904	1.28
08	1	3,138	11,092	25,994	1,945		42,170	33,883	1.24
09	173	2,324	32,668	45,226			80,391	65,278	1.23
10	1	4,331	30,513					32,009	
11	106	9,360						46,307	
12	2,483							32,656	
13								28,651	
14								63,306	
15								82,615	
Average							108,898	47,980	2.27
							Contrast =	3.12	

Note: 1982–2001 based on 3-Area Index, radiotelemetry (2002–2004) and the mainstem Yukon River sonar at Eagle (2005–2015). Current brood year data are preliminary. Average includes the years with complete brood information: 1982–2008.

Appendix A10.–Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2015.

			Age [a]					
Location	Sample Size		3	4	5	6	7	Total
East Fork	547	Male	0.0	37.7	11.7	11.0	0.0	60.3
Andreafsky River [a]		Female	0.0	0.7	2.6	36.4	0.0	39.7
		Total	0.0	38.4	14.3	47.3	0.0	
Pilot Station	410	Male	0.0	19.8	24.4	19.8	0.0	63.9
test fishery [b]		Female	0.0	2.7	9.5	23.4	0.5	36.1
		Total	0.0	22.4	33.9	43.2	0.5	
Gisasa River [c]	243	Male	0.8	25.9	33.7	9.9	0.0	70.4
		Female	0.0	0.0	5.8	23.9	0.0	29.6
		Total	0.8	25.9	39.5	33.7	0.0	
Henshaw Creek [a]	459	Male	0.0	24.4	26.6	7.6	0.0	58.6
		Female	0.0	0.2	14.2	26.8	0.2	41.4
		Total	0.0	24.6	40.7	34.4	0.2	
Eagle test fishery [b]	927	Male	0.3	10.8	26.6	19.8	0.3	57.9
		Female	0.0	0.0	7.8	32.5	1.8	42.1
		Total	0.3	10.8	34.4	52.3	2.2	
Chena River [d]	500	Male	0.6	19.8	9.2	15.0	0.0	44.6
		Female	0.0	0.0	6.8	48.0	0.6	55.4
		Total	0.6	19.8	16.0	63.0	0.6	
Salcha River [d]	467	Male	0.6	22.9	22.7	10.7	0.0	57.0
		Female	0.0	0.0	12.8	30.2	0.0	43.0
		Total	0.6	22.9	35.5	40.9	0.0	

[a] Samples were collected from a weir trap.

[b] Samples were from test fishing with drift gillnets.

[c] Percent male and female have not been adjusted to account for sampling bias.

[d] Samples were handpicked from carcasses.

Appendix A11.–Summer chum salmon age and sex percentages with average lengths from selected Yukon River escapement projects, 2015.

Location	Sample Size		Age 3	4	5	6	Total	Average Length (mm)
Anvik River [a]	705	Male	0.6	13.8	31.0	0.7	46.0	575.7
		Female	1.2	20.9	30.8	1.1	54.0	540.4
		Total	1.8	34.6	61.8	1.8		
East Fork	946	Male	0.1	17.1	46.3	0.2	63.7	567.1
Andreafsky River [b]		Female	0.3	13.5	22.5	0.0	36.3	525.9
		Total	0.4	30.6	68.8	0.2		
Gisasa River [b]	1361	Males	1.0	14.7	29.4	0.3	45.4	570.98
		Females	1.2	17.7	35.2	0.4	54.6	533.73
		Total	2.3	32.4	64.6	0.7		
Henshaw Creek [b]	930	Males	1.4	13.7	27.2	0.3	42.1	575.8
		Females	1.9	18.8	37.4	0.4	57.9	546.3
		Total	3.2	32.4	64.6	0.7		
Salcha River [c]	160	Males	1.6	16.0	31.9	0.4	49.4	587.9
		Females	1.6	16.4	32.7	0.4	50.6	560.4
		Total	5.7	44.7	42.8	6.9		

[a] Samples were collected by beach seine, structure is scales.

[b] Samples were collected from a weir trap, structure is scales.

[c] Samples were handpicked carcasses, structure is vertebra.

Appendix A12.–Total (U.S. and Canada) Yukon River Chinook salmon harvest percentage by stock group, 1981–2014.

Year [a]	Stock Group		
	Lower	Middle	Upper
1981	5.4	54.5	40.1
1982	13.9	24.7	61.4
1983	12.9	33.7	53.3
1984	25.3	40.2	34.5
1985	27.6	22.3	50.1
1986	19.5	9.6	70.9
1987	15.9	19.6	64.5
1988	21.8	15.8	62.5
1989	24.4	15.9	59.7
1990	20.2	25.2	54.7
1991	28.0	25.3	46.7
1992	16.3	21.8	61.9
1993	21.5	25.4	53.1
1994	18.2	21.4	60.4
1995	17.9	22.4	59.7
1996	21.0	10.4	68.6
1997	26.4	16.8	56.9
1998	32.7	17.4	49.8
1999	40.1	6.3	53.6
2000	33.9	12.3	53.8
2001	31.6	16.0	52.4
2002	19.4	29.2	51.4
2003	6.8	28.9	64.3
2004	15.3	28.8	55.9
2005	20.7	21.4	57.9
2006	17.6	27.6	54.9
2007	13.0	30.6	56.4
2008	17.0	28.0	55.0
2009	11.1	31.4	57.5
2010	17.8	32.7	49.5
2011	13.9	29.8	56.3
2012	13.3	34.8	51.9
2013	13.4	21.0	65.6
2014	25.4	27.8	46.8
2015[b]			
Average			
1981-2013	19.8	24.3	55.9
2009-2013	13.9	29.9	56.2
Minimum-13	5.4	6.3	34.5
Maximum-13	40.1	54.5	70.9

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] Estimates for 2015 have not yet been finalized.

Appendix A13.–Yukon River Chinook salmon harvest percentage by stock group in Alaska, 1981–2014.

Year [a]	Stock Group		
	Lower	Middle	Upper
1981	5.9	59.8	34.3
1982	15.4	27.5	57.1
1983	14.2	37.0	48.9
1984	28.0	44.3	27.7
1985	30.4	24.6	45.1
1986	22.3	10.9	66.8
1987	17.4	21.4	61.2
1988	24.9	18.1	57.0
1989	27.2	17.7	55.1
1990	22.8	28.4	48.8
1991	31.8	28.7	39.6
1992	18.0	24.1	57.8
1993	23.7	28.0	48.3
1994	20.4	24.1	55.5
1995	20.0	25.0	55.0
1996	24.0	11.8	64.2
1997	28.9	18.3	52.8
1998	34.7	18.5	46.8
1999	44.1	6.9	49.0
2000	37.5	13.6	48.9
2001	37.5	19.0	43.5
2002	22.1	33.3	44.6
2003	7.5	31.7	60.8
2004	16.9	31.6	51.5
2005	23.4	24.2	52.4
2006	19.2	30.2	50.5
2007	13.7	32.3	54.0
2008	18.2	30.0	51.8
2009	12.7	35.8	51.6
2010	18.7	34.3	47.0
2011	15.6	33.3	51.1
2012	14.4	37.5	48.2
2013	16.0	25.0	59.0
2014	26.3	28.8	44.8
2015[b]			
Average			
1981-2013	22.0	26.9	51.1
2009-2013	15.5	33.2	51.4
Minimum-13	5.9	6.9	27.7
Maximum-13	44.1	59.8	66.8

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] Estimates for 2015 have not yet been finalized.

Appendix A14.–Upper stock group percentage, by country, from the Yukon River Chinook salmon harvest, 1981–2014.

	Upper Stock Group	
Year [a]	U.S.	Canada
1981	78.1	21.9
1982	83.5	16.5
1983	83.7	16.3
1984	72.7	27.3
1985	81.6	18.4
1986	82.7	17.3
1987	86.7	13.3
1988	79.8	20.2
1989	82.9	17.1
1990	79.2	20.8
1991	74.8	25.2
1992	84.5	15.5
1993	82.6	17.4
1994	81.8	18.2
1995	82.4	17.6
1996	81.9	18.1
1997	84.8	15.2
1998	88.8	11.2
1999	83.0	17.0
2000	81.9	18.1
2001	69.8	30.3
2002	76.3	23.5
2003	86.2	13.8
2004	83.7	16.3
2005	80.1	19.9
2006	84.1	15.9
2007	90.5	9.5
2008	88.1	11.9
2009	78.8	21.2
2010	90.5	9.5
2011	81.0	19.0
2012	86.3	13.7
2013	75.5	24.5
2014	92.2	7.8
2015[b]		
Average		
1981-2013	82.1	17.9
2009-2013	82.4	17.6
Minimum-13	69.8	9.5
Maximum-13	90.5	30.3

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] Estimates for 2015 have not yet been finalized.

Appendix A15.–Summary of releases for coded wire tagged Chinook salmon from Whitehorse Hatchery, 1985–2015.

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	02-32-48	26,670	518	0.019	27,188		0	27,188
Michie	25-May-85	02-32-26	28,269	518	0.018	28,787		0	28,787
Michie	25-May-85	02-32-47	43,325	518	0.012	43,843		0	43,843
Wolf	1985	no-clip	0	0		0		10,520	10,520
SUM	1985		98,264	1,555		99,819		10,520	110,339
Michie	1986	02-37-31	77,170			77,170		1,000	78,170
Wolf	1986					0		5,720	5,720
SUM	1986		77,170			77,170		6,720	83,890
Michie	5-Jun-87	02-48-12	47,644	1,361	0.028	49,005	2.50	9,598	58,603
Michie	5-Jun-87	02-48-13	49,344	808	0.016	50,152	2.50	9,141	59,293
Michie	5-Jun-87	02-48-14	51,888	559	0.011	52,447	2.50	9,422	61,869
Michie	5-Jun-87	02-48-15	43,367	2,066	0.045	45,433	2.50	7,868	53,301
Michie	5-Jun-87	02-42-58	25,945	245	0.009	26,190	2.50	4,171	30,361
Wolf	30-May-87	02-42-59	26,752	123	0.005	26,875	2.50	422	27,297
SUM	1987		244,940	5,162		250,102		40,622	290,724
Michie	10-Jun-88	02-55-49	77,670	1,991	0.025	79,661	2.80	84,903	164,564
Michie	10-Jun-88	02-555-0	78,013	1,592	0.020	79,605	2.70	85,288	164,893
Wolf	5-Jun-88	no-clip	0	0		0		25,986	25,986
SUM	1988		155,683	3,583		159,266		196,177	355,443
Wolf	1989	no-clip	0	0		0		22,388	22,388
Michie	6-Jun-89	02-60-04	26,161	326	0.012	26,487	2.30	0	26,487
Michie	6-Jun-89	02-60-05	24,951	128	0.005	25,079	2.30	0	25,079
Michie	6-Jun-89	02-60-06	25,098	291	0.011	25,389	2.40	0	25,389
Michie	6-Jun-89	02-60-07	25,233	156	0.006	25,389	2.20	95,724	121,113
Fishway	6-Jun-89	02-60-08	25,194	357	0.014	25,551	2.70	0	25,551
Fishway	6-Jun-89	02-60-09	25,190	351	0.014	25,541	2.70	0	25,541
SUM	1989		151,827	1,609		153,436		118,112	271,548
Wolf	6-Jun-90	no-clip	0	0		0		11,969	11,969
Michie	2-Jun-90	02-02-38	24,555	501	0.020	25,056	2.30	0	25,056
Michie	2-Jun-90	02-02-39	24,345	753	0.030	25,098	2.30	0	25,098

-continued-

Appendix A15.–Page 2 of 8.

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Fishway	2-Jun-90	02-02-60	24,508	501	0.020	25,009	2.20	0	25,009
Fishway	2-Jun-90	02-02-63	25,113	254	0.010	25,367	2.20	0	25,367
SUM	1990		98,521	2,009		100,530		11,969	112,499
Wolf	8-Jun-91	18-03-22	49,477	793	0.016	50,270	2.30	0	50,270
Fishway	6-Jun-91	18-03-23	52,948	193	0.004	53,141	2.30	0	53,141
Michie	6-Jun-91	18-03-24	50,020	176	0.004	50,196	2.30	87,348	137,544
SUM	1991		152,445	1,162		153,607		87,348	240,955
Wolf	4-Jun-92	18-08-29	48,239	0	0.000	48,239	2.40	0	48,239
Fishway	4-Jun-92	18-08-28	49,356	99	0.002	49,455	2.30	0	49,455
Michie	4-Jun-92	18-08-30	52,946	643	0.012	53,589	2.20	249,166	302,755
SUM	1992		150,541	742		151,283		249,166	400,449
Wolf	6-Jun-93	18-12-15	50,248	0	0.000	50,248	2.30	0	50,248
Fishway	6-Jun-93	18-12-16	49,957	434	0.009	50,391	2.30	0	50,391
Michie	6-Jun-93	18-12-17	50,169	0	0.000	50,169	2.30	290,647	340,816
SUM	1993		150,374	434		150,808		290,647	441,455
Wolf	2-Jun-94	18-14-27	50,155	270	0.005	50,425	2.30	0	50,425
Michie	2-Jun-94	18-14-28	50,210	127	0.003	50,337	2.30	158,780	209,117
Fishway	2-Jun-94	18-14-29	50,415	125	0.002	50,540	2.30	0	50,540
SUM	1994		150,780	522		151,302		158,780	310,082
Wolf	6-Jun-95	18-12-46	10,067	164	0.016	10,231	1.67	0	10,231
Wolf	6-Jun-95	18-12-47	9,122	0	0.000	9,122	1.53	0	9,122
Michie	6-Jun-95	18-18-26	25,231	337	0.013	25,568	2.47	4,552	30,120
Michie	6-Jun-95	18-18-27	25,187	141	0.006	25,328	2.33	0	25,328
SUM	1995		69,607	642		70,249		4,552	74,801
Wolf	26-May-96	18-07-48	10,131	102	0.010	10,233	2.30	0	10,233
Fox	4-Jun-96	18-28-23	35,452	0	0.000	35,452	2.43	0	35,452
Byng	4-Jun-96	18-10-41	25,263	516	0.020	25,779	2.37	0	25,779
Michie	5-Jun-96	18-33-45	50,082	1,022	0.020	51,104	2.51	0	51,104
Michie	5-Jun-96	18-33-46	50,260	508	0.010	50,768	2.43	0	50,768
Michie	5-Jun-96	18-33-47	49,985	505	0.010	50,490	2.32	0	50,490

-continued-

Appendix A15.–Page 3 of 8.

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Judas	4-Jun-96	18-33-48	49,798	1,016	0.020	50,814	2.43	0	50,814
McClintock	4-Jun-96	18-33-49	49,991	302	0.006	50,293	2.27	0	50,293
SUM	1996		320,962	3,971		324,933		0	324,933
Wolf	1-Jun-97	18-23-25	14,850	150	0.010	15,000	2.30	0	15,000
Wolf	1-Jun-97	18-23-26	20,334	0	0.000	20,334		0	20,334
Wolf	8-Jun-97	18-29-06	10,158	0	0.000	10,158		0	10,158
Fox	11-Jun-97	18-25-54	25,242	0	0.000	25,242	2.43	0	25,242
Fox	11-Jun-97	18-25-55	24,995	253	0.010	25,248		0	25,248
Byng	11-Jun-97	18-29-07	10,029	0	0.000	10,029	2.37	0	10,029
Byng	11-Jun-97	18-29-05	10,155	0	0.000	10,155		0	10,155
Michie	11-Jun-97	18-28-59	49,657	502	0.010	50,159	2.51	0	50,159
Michie	11-Jun-97	18-28-60	50,130	0	0.000	50,130	2.43	0	50,130
Judas	7-Jun-97	18-23-27	19,951	202	0.010	20,153	2.43	0	20,153
Judas	11-Jun-97	18-25-53	25,146	0	0.000	25,146	2.43	0	25,146
McClintock	11-Jun-97	18-25-51	25,399	0	0.000	25,399	2.27	0	25,399
McClintock	11-Jun-97	18-25-52	24,792	251	0.010	25,043		0	25,043
SUM	1997		310,838	1,358		312,196		0	312,196
Michie	12-Jun-98	18-41-22	49,243	1,004	0.020	50,247	2.84	0	50,247
Michie	12-Jun-98	18-41-21	49,197	1,004	0.020	50,201	2.81	0	50,201
Byng	12-Jun-98	18-31-60	24,518	1,022	0.040	25,540	3.00	0	25,540
McClintock	12-Jun-98	18-40-43	49,810	503	0.010	50,313	2.76	0	50,313
Judas	13-Jun-98	02-54-17	19,018	1,432	0.070	20,450	2.55	0	20,450
Judas	12-Jun-98	18-31-59	25,331	256	0.010	25,587	2.60	0	25,587
Wolf	6-Jun-98	02-19-58	10,104	421	0.040	10,525	1.95	0	10,525
Wolf	4-Jun-98	02-46-06	34,813	710	0.020	35,523	2.63	0	35,523
SUM	1998		262,034	6,352		268,386		0	268,386
Michie	6-Jun-99			80,393		80,393	3.13	0	80,393
Byng	6-Jun-99			64,430		64,430	2.92	0	64,430
McClintock	6-Jun-99			64,169		64,169	2.95	0	64,169
Wolf	6-Jun-99			31,048		31,048	3.07	0	31,048

-continued-

Appendix A15.–Page 4 of 8.

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
SUM	1999			240,040		240,040		0	240,040
Michie	8-Jun-00	18-31-28	25,114	254	0.010	25,368	2.80	0	25,368
Michie	8-Jun-00	18-31-29	25,037	253	0.010	25,290	2.80	0	25,290
Michie	8-Jun-00	18-43-03	10,907	110	0.010	11,017	2.84	0	11,017
McClintock	8-Jun-00	18-13-54	25,041	254	0.010	25,295	2.70	0	25,295
McClintock	8-Jun-00	18-13-55	25,016	253	0.010	25,269	2.68	0	25,269
Wolf	4-Jun-00	18-23-53	25,071	253	0.010	25,324	2.67	0	25,324
Wolf	4-Jun-00	18-23-54	25,012	254	0.010	25,266	2.40	0	25,266
SUM	2000		161,198	1,631		162,829		0	162,829
Michie	8-Jun-01	18-44-16	25,318	256	0.010	25,574	2.68	0	25,574
Michie	8-Jun-01	18-44-17	27,293	276	0.010	27,569	2.68	0	27,569
Michie	8-Jun-01	18-44-18	27,337	276	0.010	27,613	2.60	0	27,613
Michie	8-Jun-01	18-44-19	11,629	117	0.010	11,746	2.60	0	11,746
McClintock	8-Jun-01	18-44-12	24,526	248	0.010	24,774	3.13	0	24,774
McClintock	8-Jun-01	18-44-13	25,033	253	0.010	25,286	3.13	0	25,286
McClintock	8-Jun-01	18-36-50	10,840	110	0.010	10,950	3.13	0	10,950
Byng	8-Jun-01	18-44-14	25788	260	0.010	26,048	2.84	0	26,048
Byng	8-Jun-01	18-44-15	25,136	254	0.010	25,390	2.84	0	25,390
Wolf	28-May-01	18-44-10	26,205	265	0.010	26,470	3.34	0	26,470
Wolf	28-May-01	18-44-11	23,902	241	0.010	24,143	3.34	0	24,143
SUM	2001		253,007	2,556		255,563		0	255,563
Wolf	23-May-02	18-51-01	25,334	126	0.005	25,460	3.30	0	25,460
Wolf	2-Jun-02	18-51-02	25,079	177	0.007	25,256	3.10	0	25,256
McClintock	10-Jun-02	18-51-03	24,769	505	0.020	25,274	3.60	0	25,274
Byng	10-Jun-02	18-51-04	24,907	0	0.000	24,907	3.00	0	24,907
Byng	10-Jun-02	18-51-05	24,925	125	0.005	25,050	3.00	0	25,050
Michie	10-Jun-02	18-51-06	27,114	191	0.007	27,305	3.20	0	27,305
Michie	10-Jun-02	18-51-07	26,854	0	0.000	26,854	3.02	0	26,854
Michie	10-Jun-02	18-50-61	27,850	281	0.010	28,131	3.20	0	28,131
Michie	10-Jun-02	18-50-62	27,241	0	0.000	27,241	3.04	0	27,241

-continued-

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	10-Jun-02	18-50-63	8,481	86	0.01	8567	3.2	0	8567
Yukon River								3,062	3062
SUM	2002		242,554	1,491		244,045		3,062	247,107
Wolf	25-May-03	18-47-48	27,489	83	0.0030	27,572	2.72	0	27,572
Wolf	25-May-03	18-47-49	26,704	161	0.0060	26,865	2.69	0	26,865
Byng	2-Jun-03	18-47-47	23,483	71	0.0030	23,554	3.01	0	23,554
Byng	2-Jun-03	18-47-46	27,058	54	0.0020	27,112	2.98	0	27,112
Michie	2-Jun-03	18-49-58	28,485	0	0.0000	28,485	3.05	0	28,485
Michie	2-Jun-03	18-49-59	27,519	0	0.0000	27,519	2.98	0	27,519
Michie	2-Jun-03	18-49-60	15,541	0	0.0000	15,541	3.07		15,541
Judas L. (not in totals)	6-Jun-03							2,500	
SUM	2003		176,279	369		176,648		0	176,648
Wolf	5/28-30/04	01-01-70	28,946	292		29,238	2.90	0	29,238
Wolf	22-Jun-04							2,514	2,514
Mainstem	5/28-29/04	02-01-69	24,920	431		25,351	3.10	0	25,351
Byng	8-Jun-04	02-01-68	24,401	626		25,027	3.36	0	25,027
McClintock	8-Jun-04	02-01-67	24,246	879		25,125	3.20	0	25,125
Michie	8-Jun-04	02-01-66	24,609	554		25,163	3.12	0	25,163
Michie	8-Jun-04	02-01-65	13,594	306		13,900	3.12	0	13,900
SUM	2004		140,716	3,088		143,804		2,514	146,318
Wolf	5/31-6/05	18-19-36	10,751	109	1.000	10,860	2.50	0	10,860
Wolf	5/31-6/05	18-56-17	5,835	59	1.000	5,894	2.50	0	5,894
Wolf	7-Jul-05			614		614			614
Byng	13-Jun-05	18-56-18	5,853	119	2.000	5,972	2.50	0	5,972
Byng	13-Jun-05	18-56-19	4,369	89	2.000	4,458	2.50	0	4,458
McClintock	13-Jun-05	18-44-19	10,632	0	0.000	10,632	2.50	0	10,632
Michie	13-Jun-05	02-01-64	4,870	0	0.000	4,870	2.50	0	4,870
Michie	13-Jun-05	02-01-65	5,983	0	0.000	5,983	2.50	0	5,983
Michie	13-Jun-05	08-01-65	28,082	284	1.000	28,366	2.50	0	28,366
Michie	13-Jun-05	18-56-20	5,906	0	0.000	5,906	2.50	0	5,906

-continued-

Appendix A15.–Page 6 of 8.

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Mainstem	6/02,6/14,07/7	08-01-68	28,991	293	1.000	29,284	2.50	0	29,284
SUM	2005		111,272	1,567		112,839			112,839
Wolf	6/4 -11/06	08-01-66	26,412	0	0.000	26,412	2.66	0	26,412
Wolf	6/4 - 6/11	08-01-71	8,718	88	1.000	8,806	2.66	0	8,806
Mainstem	8-Jun-06	08-01-72	6,761	427	1.500	7,188	2.63	0	7,188
Mainstem	8-Jun-06	08-01-67	28,045	103	1.500	28,148	2.63	0	28,148
Michie	14-Jun-06	08-01-68	39,164	596	1.500	39,760		0	39,760
Michie	14-Jun-06	08-01-74	3,692	56	1.500	3,748	2.41	0	3,748
McClintock	14-Jun-06	08-01-70	29,282	296	1.000	29,578	2.58	0	29,578
McClintock	14-Jun-06	08-01-73	5,426	55	1.000	5,481	2.89	0	5,481
Wolf	11-Jun-06		0	7,658	0.000	7,658	3.02	0	7,658
SUM	2006		147,500	9,279		156,779			156,779
Wolf	5/24-6/3/07	Agency Tags 18	37,781	771	2.000	38,552		0	38,552
Wolf	3-Jun-07			2,632	0.000	2,632	2.33	0	2,632
Mainstem	29-May-07	Agency Tags 18	35,253	356	1.000	35,609	2.87	0	35,609
Michie	8-Jun-07	Agency Tags 18	50,084	506	1.000	50,590	3.22	0	50,590
McClintock	8-Jun-07	Agency Tags 18	38,383	388	1.000	38,771	3.22	0	38,771
SUM	2007		161,501	4,653		166,154			166,154
Wolf	6/01-26	Agency Tags 08	10,939	0	0.000	10,939	2.97		10,939
Wolf	26-Jun-08			2,618		2,618			2,618
Mainstem	5-Jun-08	Agency Tags 08	20,498	418	2.000	20,916	2.84		20,916
Michie	5-Jun-08	Agency Tags 08	24,615	502	2.000	25,117	2.71		25,117
McClintock	5-Jun-08	Agency Tags 08	24,687	1,029	4.000	25,716	2.89		25,716
SUM	2008		80,739	4,567		85,306		0	85,306
Wolf	31-May-09	Agency Tags 08	19,652	199	1.000	19,851	2.76		19,851
Wolf	11-Jun-09			2,672		2,672			2,672
Mainstem	6-Jun-09	Agency Tags 08	42,648	258	0.600	42,906	3.00		42,906
Michie	6-Jun-09	Agency Tags 08	77,048	778	0.100	77,826	2.87		77,826
McClintock	6-Jun-09	Agency Tags 08	26,338	53	0.020	26,391	2.52		26,391
SUM	2009		165,686	3,960		169,646		0	169,646

-continued-

Release Location	Release Date	Code	# Tagged & Clipped [a]	Adipose Clipped Only	%Tag-Loss	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	30-May-10	Agency Tag 18	12,000	0	0.000	12,000	2.89	0	12,000
Michie	1-Jun-10	Agency Tag 18	66,848	2,067	3.000	68,915	3.00	0	68,915
McClintock	1-Jun-10	Agency Tag 18	19,714	0	0.000	19,714	3.00	0	19,714
McClintock	1-Jun-10			1,369		1,369		0	1,369
Mainstem	1-Jun-10	Agency Tag 18	23,985	242	1.000	24,227	2.98	0	24,227
SUM	2010		122,547	3,678		126,225		0	126,225
Wolf	10-Jun-11	Agency Tag 18	10,000	1,550	0.000	11,550	2.76	0	11,550
Michie	6-Jun-11	Agency Tag 18	65,640	1,000	1.500	66,640	2.94	0	66,640
McClintock	6-Jun-11	Agency Tag 18	32,811	0	0.000	32,811	2.65	0	32,811
Mainstem	6-Jun-11	Agency Tag 18	23,921	0	0.000	23,921	2.67	0	23,921
SUM	2011		132,372	2,550		134,922		0	134,922
Wolf	27-May-12	18-61-03	10,171	103	1.000	10,274	2.80	0	10,274
Michie	6-Jun-12	18-13-74	43,412	488	1.100	43,900	2.87	0	43,900
Michie	6-Jun-12	18-17-79	36,033	549	1.500	36,582	2.87	0	36,582
Mainstem	6-Jun-12	18-26-85	28,345	1,705	0.500	30,050	2.78	0	30,050
McClintock	6-Jun-12	18-26-86	27,264	418	1.500	27,682	2.83	0	27,682
SUM	2012		145,225	3,263		148,488		0	148,488
Wolf	27-May-13	18-60-25	10,377	3,473	1.003	13,850	2.24	0	13,850
Michie	4-Jun-13	18-25-79	46,625	952	2.000	47,577	2.7	0	47,577
Michie	4-Jun-13	18-17-82	32,358	660	2.000	33,018	2.46	0	33,018
Mainstem	4-Jun-13	18-36-08	9,192	93	1.000	9,285	2.44	0	9,285
Mainstem	4-Jun-13	18-36-09	6,857	140	2.000	6,997	2.44	0	6,997
McClintock	4-Jun-13	18-27-64	31,665	0	0.000	31,665	2.35	0	31,665
SUM	2013		137,074	5,318		142,392		0	142,392
Wolf	1-Jun-14	18-31-84	6,509	2,821	3.000	6,710	2.15	0	9,330
Michie	3-Jun-14	18-31-87	68,638	1,401	2.000	70,039	2.72	0	70,039
McClintock	3-Jun-14	18-28-74	29,618	604	2.000	30,222	2.46	0	30,222
Mainstem	3-Jun-14	18-31-85	14,883	150	1.000	15,033	2.22	0	15,033
SUM	2014		119,647	4,977		122,004		0	124,624
Wolf	31-May-15	18-39-96	10,195	4,032	2.000	14,227	2.08	0	14,023
Michie	3-Jun-15	18-40-65	78,594	1,604	2.000	80,198	2.35	0	80,198
M'Clintock	3-Jun-15	18-40-64	29,919	303	1.000	30,222	2.24	0	30,222
Mainstem	3-Jun-15	18-39-98	9,742	99	1.000	9,841	2.35	0	9,841
Mainstem	3-Jun-15	18-39-97	8,980	91	1.000	9,071	2.38	0	9,071
Fox Cr [b]	8-Jun-15	18-31-86	14,949	151	1.000	15,100	2.50	0	15,100

-continued-

SUM	2015	137,430	6,129	143,559		0	143,355
AVERAGE	2006–2015	134,972	4,837	139,548	2.67	0	139,789
TOTAL	1985–2015	4,828,734	328,217	5,154,330		1,180,189	6,336,935

Note: Hatchery Chinook salmon fry released as 0+ sub yearling smolt.

[a] Usually corresponds to "tagged" category on Mark–Recapture Program (MRP) release forms. Coded Wire Tag (CWT) data recorded from CWT release sheets 1989-94 and; CWT data prior to 1987 not verified against Salmonid Enhancement Program (SEP) records.

[b] Tributary to Lake Laberge, Release numbers not included in long term average and totals.

Appendix A16.–Summary of releases of Chinook salmon from Yukon Territory instream incubation/rearing sites 1991–2015.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
Klondike R.	1990	Tatchun Ck.	02-01-01-02-12	Spring Fry	Tatchun Ck.	6/28/1991	6/28/1991	13593	21	650	14264	0.74
Klondike R.	1990	Tatchun Ck.	02-01-01-02-09	Spring Fry	Tatchun Ck.	6/28/1991	6/28/1991	15247	173	750	16170	0.74
Klondike R.	1991	Tatchun Ck.	18-06-45	Spring Fry	Tatchun Ck.	NA	8/31/1992	11734	0	817	12551	2.47
Klondike R.	1991	Tatchun Ck.	02-33-56	Spring Fry	Tatchun Ck.	NA	8/31/1992	6453	0	852	7305	2.47
Klondike R.	1991	Tatchun Ck.	18-06-44	Spring Fry	Tatchun Ck.	NA	8/31/1992	11585	0	320	11905	2.47
Klondike R.	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk.	6/1992	6/1992	0	0	1500	1500	0.00
Klondike R.	1993	Klondike R.	02-01-01-05-03	Spring Fry	Klondike R.	6/30/1994	6/30/1994	6174	10	54	6238	0.88
Klondike R.	1993	Tatchun Ck.	02-01-01-04-07	Spring Fry	Tatchun Ck.	6/30/1994	6/30/1994	12077	246	71	12394	0.99
Klondike R.	1993	Tatchun Ck.	02-01-01-05-05	Spring Fry	Tatchun Ck.	6/30/1994	6/30/1994	9982	0	61	10043	0.99
Klondike R.	1994	Klondike R.	02-01-01-06-03	Spring Fry	Klondike R.	NA	7/4/1995	2159	11	190	2360	0.75
Klondike R.	1994	Klondike R.	02-01-01-06-02	Spring Fry	Klondike R.	NA	7/4/1995	1809	16	56	1881	0.75
Klondike R.	1994	Tatchun Ck.	02-01-01-05-11	Spring Fry	Tatchun Ck.	7/4/1995	7/4/1995	12431	100	686	13217	0.81
Klondike R.	1994	Tatchun Ck.	02-01-01-05-15	Spring Fry	Tatchun Ck.	7/4/1995	7/4/1995	2490	33	177	2700	0.81
Klondike R.	1994	Tatchun Ck.	02-01-01-06-01	Spring Fry	Tatchun Ck.	7/4/1995	7/4/1995	1476	19	155	1650	0.81
Klondike R.	1994	Tatchun Ck.	02-01-01-05-13	Spring Fry	Tatchun Ck.	7/4/1995	7/4/1995	11649	238	413	12300	0.81
Klondike R.	1995	Klondike R.	02-01-01-04-08	Spring Fry	Klondike R.	6/22/1996	6/22/1996	11423	1707	0	13130	0.76

-continued-

Appendix A16.–Page 2 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
Mayo River	1991	Mayo R.	NOCN9147	Spring Fry	Mayo R.	6/1992	6/1992	0	0	13000	13000	0.00
Mayo River	1992	Mayo R.	NOCN9292	Spring Fry	Mayo R.	7/1993	7/1993	0	0	500	500	0.00
McIntyre Ck.	1990	Takhini R.	02-33-55	Fall Fry 5-8 gm	Takhini R.	9/13/1990	9/13/1990	7967	80	39	8086	3.20
McIntyre Ck.	1990	Takhini R.	02-33-54	Fall Fry 5-8 gm	Takhini R.	9/13/1990	9/13/1990	10789	109	101	10999	3.20
McIntyre Ck.	1991	Takhini R.	02-01-01-03-08	Spring Fry	Flat Ck.	NA	7/4/1992	12141	143	3425	15709	0.98
McIntyre Ck.	1991	Takhini R.	02-01-01-03-09	Spring Fry	Flat Ck.	NA	7/4/1992	13102	466	1398	14966	0.98
McIntyre Ck.	1991	Takhini R.	02-01-01-03-10	Spring Fry	Flat Ck.	NA	7/4/1992	4955	261	601	5817	0.98
McIntyre Ck.	1992	Klondike R.	02-01-01-04-04	Spring Fry	Klondike R.	7/1/1993	7/1/1993	12832	240	144	13216	1.14
McIntyre Ck.	1992	Klondike R.	02-01-01-04-05	Spring Fry	Klondike R.	7/1/1993	7/1/1993	7546	256	167	7969	1.14
McIntyre Ck.	1992	Takhini R.	02-34-24	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	9532	823	95	10450	2.71
McIntyre Ck.	1992	Takhini R.	02-34-23	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	9822	850	218	10890	2.71
McIntyre Ck.	1992	Takhini R.	18-14-54	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	10925	567	227	11719	2.71
McIntyre Ck.	1992	Takhini R.	18-14-53	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	10658	865	226	11749	2.71
McIntyre Ck.	1992	Takhini R.	02-02-17	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	2291	114	37	2442	2.71
McIntyre Ck.	1992	Takhini R.	02-34-22	Spring Fry	Flat Ck.	8/17/1993	8/17/1993	10355	314	40	10709	2.71
McIntyre Ck.	1992	Tatchun Ck.	02-01-01-04-02	Spring Fry	Tatchun Ck.	6/17/1993	6/17/1993	4654	633	335	5622	0.76
McIntyre Ck.	1993	Takhini R	18-17-51	Spring Fry	Flat Ck.	8/26/1994	8/31/1994	7410	46	222	7678	2.60

-continued-

Appendix A16.–Page 3 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Ck.	1993	Takhini R.	18-17-50	Spring Fry	Flat Ck.	8/26/1994	8/31/1994	11227	40	87	11354	2.6
McIntyre Ck.	1993	Takhini R.	18-17-49	Spring Fry	Flat Ck.	8/26/1994	8/31/1994	11071	159	142	11372	2.6
McIntyre Ck.	1993	Takhini R.	18-17-48	Spring Fry	Flat Ck.	8/26/1994	8/31/1994	11375	0	104	11479	2.6
McIntyre Ck.	1993	Takhini R.	18-17-52	Spring Fry	Flat Ck.	8/26/1994	8/31/1994	10668	21	198	10887	2.6
McIntyre Ck.	1993	Takhini R.	02-02-16	Spring Fry	Takhini R.	8/30/1994	8/30/1994	9343	271	36	9650	2.8
McIntyre Ck.	1993	Takhini R.	02-01-63	Spring Fry	Takhini R.	8/30/1994	8/30/1994	10899	222	62	11183	2.8
McIntyre Ck.	1994	Takhini R.	02-01-01-04-15	Spring Fry	Takhini R.	8/14/1995	8/14/1995	9887	0	410	10297	2.2
McIntyre Ck.	1994	Takhini R.	02-01-01-04-13	Spring Fry	Takhini R.	8/14/1995	8/14/1995	14452	0	365	14817	2.2
McIntyre Ck.	1994	Takhini R.	02-01-01-04-12	Spring Fry	Flat Ck.	8/14/1995	8/14/1995	14193	59	281	14533	2.2
McIntyre Ck.	1994	Takhini R.	02-01-01-04-14	Spring Fry	Flat Ck.	8/14/1995	8/14/1995	13586	130	295	14011	2.2
McIntyre Ck.	1995	Takhini R.	02-01-01-05-08	Spring Fry	Takhini R.	8/12/1996	8/12/1996	15731	251	496	16478	2.1
McIntyre Ck.	1995	Takhini R.	02-01-01-05-09	Spring Fry	Takhini R.	8/12/1996	8/12/1996	8085	41	293	8419	2.1
McIntyre Ck.	1995	Takhini R.	02-01-01-05-10	Spring Fry	Flat Ck.	8/7/1996	8/7/1996	10727	65	170	10962	2.0
McIntyre Ck.	1995	Tatchun Ck.	02-01-01-02-10	Spring Fry	Tatchun Ck.	6/27/1996	6/27/1996	14530	49	62	14641	0.8
McIntyre Ck.	1995	Tatchun Ck.	02-01-01-02-11	Spring Fry	Tatchun Ck.	6/27/1996	6/27/1996	13526	91	294	13911	0.8
McIntyre Ck.	1996	Takhini R.	02-01-01-06-14	Spring Fry	Flat Ck.	7/2/1997	7/4/1997	15622	158	382	16162	0.8
McIntyre Ck.	1996	Takhini R.	02-01-01-04-06	Spring Fry	Flat Ck.	7/2/1997	7/4/1997	14845	37	280	15162	0.8
McIntyre Ck.	1996	Tatchun Ck.	02-01-01-07-03	Spring Fry	Tatchun Ck.	6/27/1997	6/27/1997	1521	15	148	1684	1.0

-continued-

Appendix A16.–Page 4 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Ck.	1997	Tatchun Ck.	02-01-01-06-08	Spring Fry	Tatchun Ck.	6/19/1998	6/19/1998	9284	150	74	9508	1.1
McIntyre Ck.	1997	Tatchun Ck.	02-01-01-06-09	Spring Fry	Tatchun Ck.	6/19/1998	6/19/1998	10318	211	188	10717	1.1
McIntyre Ck.	1997	Tatchun Ck.	02-01-01-07-02	Spring Fry	Tatchun Ck.	6/19/1998	6/19/1998	2536	52	0	2588	1.1
McIntyre Ck.	1997	Takhini R.	02-01-01-07-09	Spring Fry	Flat Ck.	6/22/1998	6/22/1998	11374	115	115	11604	1.1
McIntyre Ck.	1997	Takhini R.	02-01-01-06-11	Spring Fry	Takhini R.	6/23/1998	6/23/1998	12933	334	118	13385	1.1
McIntyre Ck.	1997	Takhini R.	02-01-01-06-10	Spring Fry	Takhini R.	6/23/1998	6/23/1998	12186	37	115	12338	1.1
McIntyre Ck.	1997	Takhini R.	02-01-01-07-08	Spring Fry	Takhini R.	6/23/1998	6/23/1998	12341	253	148	12742	1.1
McIntyre Ck.	1998	Tatchun Ck.	02-01-01-06-12	Spring Fry	Tatchun Ck.	NA	7/8/1999	10363	0	67	10430	NA
McIntyre Ck.	1998	Tatchun Ck.	02-01-01-06-13	Spring Fry	Tatchun Ck.	NA	7/8/1999	4733	0	82	4815	NA
McIntyre Ck.	1998	Takhini R.	02-01-01-07-10	Spring Fry	Takhini R.	NA	7/14/1999	13753	28	148	13929	NA
McIntyre Ck.	1998	Takhini R.	02-01-01-07-11	Spring Fry	Flat Ck.	NA	7/15/1999	11273	23	206	11502	NA
McIntyre Ck.	1999	Takhini R.	02-01-0-07-07	Spring Fry	Flat Ck.	NA	6/23/2000	11333	114	219	11666	0.8
McIntyre Ck.	1999	Takhini R.	02-01-01-07-12	Spring Fry	Flat Ck.	NA	6/23/2000	12246	0	214	12460	0.8
McIntyre Ck.	1999	Takhini R.	02-01-01-06-04	Spring Fry	Takhini R.	NA	6/24/2000	11105	0	147	11252	0.9
McIntyre Ck.	1999	Takhini R.	02-01-01-06-05	Spring Fry	Takhini R.	NA	6/24/2000	12044	0	88	12132	0.9
McIntyre Ck.	1999	Takhini R.	02-01-01-06-06	Spring Fry	Takhini R.	NA	6/24/2000	4561	0	0	4561	0.9
McIntyre Ck.	1999	Tatchun Ck.	02-01-01-07-05	Spring Fry	Tatchun Ck.	NA	6/19/2000	12239	188	409	12836	1.0
McIntyre Ck.	1999	Tatchun Ck.	02-01-01-07-06	Spring Fry	Tatchun Ck.	NA	6/19/2000	987	10	0	997	1.0

-continued-

Appendix A16.–Page 5 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Ck.	2000	Takhini R.	02-01-01-08-01	Spring Fry	Takhini R.	NA	7/25/2001	11724	163	123	12010	1.1
McIntyre Ck.	2000	Takhini R.	02-01-01-08-02	Spring Fry	Flat Ck.	NA	7/26/2001	9995	101	60	10156	1.1
McIntyre Ck.	2000	Tatchun Ck.	02-01-01-07-05	Spring Fry	Tatchun Ck.	NA	7/9/2001	11654	360	10	12024	1.1
McIntyre Ck.	2000	Tatchun Ck.	02-01-01-07-06	Spring Fry	Tatchun Ck.	NA	7/9/2001	6321	329	14	6664	1.1
McIntyre Ck.	2001	Takhini R.	02-01-01-08-04	Spring Fry	Takhini R.	NA	6/29/2002	10109	314	301	10724	1.0
McIntyre Ck.	2001	Takhini R.	02-01-01-08-05	Spring Fry	Takhini R.	NA	6/29/2002	9814	100	405	10319	1.0
McIntyre Ck.	2001	Takhini R.	02-01-01-08-07	Spring Fry	Flat Ck.	NA	6/28/2002	4161	42	0	4203	1.0
McIntyre Ck.	2001	Tatchun Ck.	02-01-01-08-03	Spring Fry	Tatchun Ck.	NA	6/27/2002	6432	415	279	7126	1.0
McIntyre Ck.	2002	Takhini R.	02-11-22-31-41	Spring Fry	Takhini R.	NA	7/21/2003	8431	0	55	8486	1.7
McIntyre Ck.	2002	Takhini R.	02-11-22-31-42	Spring Fry	Takhini R.	NA	7/21/2003	14017	0	76	14093	1.7
McIntyre Ck.	2002	Takhini R.	02-01-01-07-01	Spring Fry	Takhini R.	NA	7/21/2003	11589	13	104	11706	1.7
McIntyre Ck.	2002	Takhini R.	02-11-21-38-46	Spring Fry	Flat Ck.	NA	7/22/2003	6426	65	0	6491	1.7
McIntyre Ck.	2002	Tatchun Ck.	02-01-01-07-14	Spring Fry	Tatchun Ck.	NA	7/4/2003	10746	50	79	10875	1.4
McIntyre Ck.	2002	Tatchun Ck.	02-01-01-07-15	Spring Fry	Tatchun Ck.	NA	7/4/2003	13261	0	166	13427	1.4
McIntyre Ck.	2003	Tatchun R.	02-01-02-01-05	Spring Fry	Tatchun R.	NA	6/27/2004	10701	805	0	11506	1.1
McIntyre Ck.	2003	Tatchun R.	02-01-02-01-04	Spring Fry	Tatchun R.	NA	6/27/2004	9919	556	0	10475	1.1
McIntyre Ck.	2003	Tatchun R.	02-01-02-01-03	Spring Fry	Tatchun R.	NA	6/27/2004	5249	395	0	5644	1.1
McIntyre Ck.	2003	Takhini R	02-01-02-02-01	Spring Fry	Takhini R.	NA	7/12/2004	10449	268	0	10717	1.3

-continued-

Appendix A16.–Page 6 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Ck.	2003	Takhini R.	02-01-02-01-06	Spring Fry	Takhini R.	NA	7/12/2004	11685	178	0	11863	1.3
McIntyre Ck.	2003	Takhini R.	02-01-02-01-08	Spring Fry	Flat Ck.	NA	8/16/2004	7785	95	0	7880	1.1
McIntyre Ck.	2003	Tatchun R.	02-01-01-09-01	Spring Fry	Tatchun R.	NA	8/20/2004	9381	143	0	9524	1.3
McIntyre Ck.	2003	Tatchun R.	02-01-01-08-08	Spring Fry	Tatchun Ck.	NA	8/20/2004	5216	79	0	5295	1.5
McIntyre Ck.	2003	Takhini R.	02-01-01-09-03	Spring Fry	Takhini R.	NA	8/21/2004	10112	154	0	10266	1.2
McIntyre Ck.	2003	Takhini R.	02-01-01-09-02	Spring Fry	Takhini R.	NA	8/21/2004	10180	155	0	10335	1.2
McIntyre Ck.	2003	Takhini R.	02-01-02-01-03	Spring Fry	Takhini R.	NA	8/21/2004	5390	82	0	5472	1.2
McIntyre Ck.	2004	Tatchun R.	02-01-01-08-09	Spring Fry	Tatchun R.	NA	6/27/2005	2361	426	0	2787	1.3
McIntyre Ck.	2004	Takhini R.	02-01-02-02-02	Spring Fry	Takhini R.	NA	7/14/2005	23068	2175	1100	26343	1.3
McIntyre Ck.	2004	Takhini R.	02-01-02-02-03	Spring Fry	Takhini R.	NA	7/14/2005	9146	1016	1100	11262	1.3
McIntyre Ck.	2004	Takhini R.	02-01-02-01-08	Spring Fry	Flat Ck.	NA	7/7/2005	5592	233	0	5825	1.3
McIntyre Ck.	2005	Takhini R.	02-1-2-2-5	Spring Fry	Takhini R.	NA	7/10/2006	10766	748	0	11514	1.3
McIntyre Ck.	2005	Takhini R.	02-1-2-1-9	Spring Fry	Takhini R.	NA	7/10/2006	10952	534	0	11486	1.6
McIntyre Ck.	2005	Takhini R.	02-1-2-2-6	Spring Fry	Takhini R.	NA	7/10/2006	11108	394	0	11502	1.6
McIntyre Ck.	2005	Takhini R.	02-1-2-3-4	Spring Fry	Takhini R.	NA	7/18/2006	2520	152	0	2672	1.6
McIntyre Ck.	2005	Tatchun R.	02-1-2-1-7	Spring Fry	Tatchun R.	NA	7/7/2006	9243	182	0	9425	2.4
McIntyre Ck.	2005	Tatchun R.	02-1-2-3-3	Spring Fry	Tatchun R.	NA	7/23/2006	26094	847	0	26941	2.4
McIntyre Ck.	2006	Takhini R	02-01-02-03-09	Spring Fry	Takhini R	7/17/2007	7/20/2007	8422	936	552	9910	1.6a
McIntyre Ck.	2006	Takhini R.	02-01-02-03-07	Spring Fry	Takhini R.	7/17/2007	7/20/2007	10108	645	185	10938	1.6a
McIntyre Ck.	2006	Takhini R.	02-01-02-03-08	Spring Fry	Takhini R.	7/17/2007	7/20/2007	10080	420	183	10683	1.6a
McIntyre Ck.	2006	Takhini R.	02-01-02-04-01	Spring Fry	Takhini R.	7/17/2007	7/20/2007	8881	567	688	10136	1.6a
McIntyre Ck.	2006	Takhini R.	02-01-02-04-04	Spring Fry	Takhini R.	7/17/2007	7/20/2007	1500	131	55	1686	1.6a

-continued-

Appendix A16.–Page 7 of 9.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Ck.	2006	Tatchun R.	02-01-02-04-02	Spring Fry	Tatchun R.	7/21/2007	7/26/2007	9775	182	185	10142	>2.4[a]
McIntyre Ck.	2006	Tatchun R.	02-01-02-04-03	Spring Fry	Tatchun R.	7/21/2007	7/26/2007	9450	476	113	10039	>2.4[a]
McIntyre Ck.	2006	Tatchun R.	02-01-02-03-05	Spring Fry	Tatchun R.	7/21/2007	7/26/2007	8972	955	196	10123	>2.4[a]
McIntyre Ck.	2006	Tatchun R.	02-01-02-03-06	Spring Fry	Tatchun R.	7/21/2007	7/26/2007	6261	261	101	6623	>2.4[a]
McIntyre Ck.	2007	Tatchun R.	02-01-02-04-03	Spring Fry	Tatchun R.	6/27/2008	6/27/2008	10170	103	145	10418	1.6
McIntyre Ck.	2007	Tatchun R.	02-01-02-04-05	Spring Fry	Tatchun R.	6/27/2008	6/27/2008	10056	311	228	10595	1.6
McIntyre Ck.	2007	Tatchun R.	02-01-02-04-06	Spring Fry	Tatchun R.	6/27/2008	6/27/2008	4345	44	328	4717	1.6
McIntyre Ck.	2007	Takhini R.	02-01-02-04-08	Spring Fry	Takhini R.	7/2/2008	7/2/2008	6756	209	197	7162	1.4
McIntyre Ck.	2007	Takhini R.	02-01-02-04-07	Spring Fry	Takhini R.	7/2/2008	7/2/2008	9490	293	119	9902	1.4
McIntyre Ck.	2008	Tatchun R.	02-01-02-05-06	Spring Fry	Tatchun R.	6/30/2009	6/30/2009	2576	136	37	2749	1.3
McIntyre/ Fox	2008	Whitehorse Fishway	02-01-02-05-01	Spring Fry	Fox Creek	7/3/2009	7/3/2009	10141	459	0	10600	1.4
McIntyre/ Fox	2008	Whitehorse Fishway	02-01-02-05-02	Spring Fry	Fox Creek	7/3/2009	7/3/2009	10019	459	0	10478	1.4
McIntyre/ Fox	2008	Whitehorse Fishway	02-01-02-05-03	Spring Fry	Fox Creek	7/3/2009	7/10/2009	9739	1253	0	10992	1.4
McIntyre/ Fox	2008	Whitehorse Fishway	02-01-02-05-04	Spring Fry	Fox Creek	7/9/2009	7/10/2009	9194	1417	0	10611	1.4
McIntyre/ Fox	2008	Whitehorse Fishway	02-01-02-05-05	Spring Fry	Fox Creek	7/9/2009	7/10/2009	9747	1126	0	10873	1.4
McIntyre Ck.	2009	Tatchun R.	02-01-02-05-07	Spring Fry	Tatchun R.	6/21/2010	6/21/2010	1373	131	0	1504	1.3
McIntyre/ Fox	2009	Whitehorse Fishway	02-01-02-05-09	Spring Fry	Fox Creek	6/18/2010	6/18/2010	7930	1251	0	9181	1.1
McIntyre Ck.	2010	Tatchun Ck.	02-01-02-06-02	Spring Fry	Tatchun R.	6/27/2011	6/27/2011	9378	152	0	9530	1.2
McIntyre Ck.	2010	Tatchun Ck.	02-01-02-06-04	Spring Fry	Tatchun R.	6/27/2011	6/27/2011	10594	3567	0	14161	1.2
McIntyre/ Fox	2010	Whitehorse Fishway	02-01-02-06-06	Spring Fry	Fox Creek	5/7/2011	5/7/2011	2864	2362	0	5226	1.2a

-continued-

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre/ Fox	2010	Whitehorse Fishway	02-01-02-06-07	Spring Fry	Fox Creek	5/7/2011	5/7/2011	1161	826	0	1987	1.2[a]
McIntyre Ck.	2011	Tatchun Ck.	02-01-02-07-01	Spring Fry	Tatchun R.	6/28/2012	6/28/2012	3481	175	0	3656	1.5
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-02	Spring Fry	Fox Creek	7/11/2012	7/11/2012	3121	87	0	3208	1.5
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-03	Spring Fry	Fox Creek	7/11/2012	7/11/2012	10060	135	0	10195	1.5
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-04	Spring Fry	Fox Creek	7/11/2012	7/11/2012	9932	139	0	10071	1.5
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-08	Spring Fry	Fox Creek	7/11/2012	7/11/2012	10612	89	0	10701	1.5
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-06-08	Spring Fry	Fox Creek	7/18/2012	7/18/2012	10577	71	0	10648	1.8
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-05	Spring Fry	Fox Creek	7/18/2012	7/18/2012	11208	113	0	11321	1.8
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-09	Spring Fry	Fox Creek	7/24/2012	7/24/2012	10806	32	0	10838	2.0
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-06	Spring Fry	Fox Creek	7/24/2012	7/24/2012	10956	76	0	11032	2.0
McIntyre/ Fox	2011	Whitehorse Fishway	02-01-02-07-07	Spring Fry	Fox Creek	7/26/2012	7/26/2012	9053	91	0	9144	2.0
McIntyre/ Fox	2012	Whitehorse Fishway	02-01-02-07-09	Spring Fry	Fox Creek	7/8/2013	7/8/2013	9940	246	0	10186	1.4
McIntyre/ Fox	2012	Whitehorse Fishway	02-01-02-08-01	Spring Fry	Fox Creek	7/8/2013	7/8/2013	11288	410	0	11698	1.4
McIntyre/ Fox	2012	Whitehorse Fishway	02-01-02-08-02	Spring Fry	Fox Creek	7/8/2013	7/8/2013	241	51	0	292	1.4
McIntyre/ Fox	2013	Whitehorse Fishway	02[b]-01-02-08-05	Spring Fry	Fox Creek	7/3/2013	7/8/2013	5516	151	0	5667	NA
McIntyre/ Fox	2013	Whitehorse Fishway	02[b]-01-02-08-04	Spring Fry	Fox Creek	7/3/2013	7/8/2013	10896	193	0	11089	NA

-continued-

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	Number Tagged	# Ad. Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre/ Fox	2013	Whitehorse Fishway	02-[b]01-02-08-03	Spring Fry	Fox Creek	7/3/2013	7/8/2013	758	90	0	848	NA
McIntyre/ Fox	2014	Whitehorse Fishway	02-01-02-08-06	Spring Fry	Fox Creek	7/12/2015	7/12/2015	10000	0	0	10000	1.2
McIntyre/ Fox	2014	Whitehorse Fishway	02-01-02-08-07	Spring Fry	Fox Creek	7/12/2015	7/12/2015	10000	0	0	10000	1.2
McIntyre/ Fox	2014	Whitehorse Fishway	02-01-02-08-08	Spring Fry	Fox Creek	7/12/2015	7/12/2015	3000	477	0	3477	1.2

Note: NA= Not Available; #=Number; Ad=Adipose; Rel.=Released. Klondike R. refers to North Klondike River.

[a] Weight (WT) not taken at release, but based on earlier sampling data and assumed growth.

[b] Initial BY 2013 "02" mark code segment could not be confirmed at the time of reporting.

Appendix A17.–Summary of samples submitted for CWT identification from adipose-clipped adult Chinook salmon, by community and sampling project in Alaska, 1989–2015.

	District 1			District 2			District 3		District 5				
		Emmonak		Pilot Station	Other	Marshall	Russian Mission	Tanana Village	Bridge Area	Fort Yukon	Eagle	District Community
Year	Comm.	Sub.	Proj.	Pro.	Comm.	Proj.	Proj.	Comm.	Comm.	Sub.	Proj.	Total Sampled
1989					2							2
1990												0
1991												0
1992	18		2									20
1993	12											12
1994	10											10
1995	14											14
1996	1											1
1997	9											9
1998	26		2									28
1999	50		5						8			63
2000	4		1									5
2001						2	1					3
2002												0
2003	2	1	3					7				13
2004	40		4					9				53
2005	11		2					1			0	14
2006	29		3			2					6	40
2007	9		2						3		2	16
2008	4	1	1	1							1	8
2009			1	1							6	8
2010	5		4								4	13
2011	2	1	8								3	14
2012	3	2	8								3	16
2013		3	3								3	9
2014			3							8	13	24
2015[a]										5	19	24
Total	249	8	52	2	2	4	1	17	11	13	60	419

Note: Commercial fishery samples are listed as "common property" in the tag lab database. http://mtalab.adfg.alaska.gov/cwt/reports/cwt_glossary.asp; Proj. = Project, Sub. = Subsistence, Comm. = Commercial; source*:* http://mtalab.adfg.alaska.gov/cwt/reports/numbersampled.asp.

[a] Preliminary number.

Appendix A18.–Recoveries of Chinook salmon coded wire tags from the Whitehorse Rapids Fish hatchery in the U.S. domestic groundfish fisheries and research trawl surveys.

Gear Type	Brood Year	Tag Code	Release Location	Release Date	Recovery Date	Age (yrs)	Length (mm)	Latitude	Longitude
Domestic	1988	2006	Michie Cr.	6/6/1989	3/25/1992	4	620	56° 44′°	173° 15′
Trawl	1990	180322	Wolf Cr.	6/8/1991	3/14/1994	4	687	60° 06′	178° 58′
	1991	180830	Michie Cr.	6/4/1992	2/24/1995	4		55° 19′	164o 43′
	1992	181215	Wolf Cr.	6/6/1993	12/6/1994	2	400	56° 52′	171° 18′
	1992	181216	Yukon R.	6/15/1993	6/2/1997	5	833	59° 29′	167° 49′
	1993	181428	Michie Cr.	6/1/1994	3/10/1998	5	760	59° 26′	178° 05′
	1995	182823	Fox Cr.	6/4/1996	3/29/1998	3	650	58° 56′	178° 06′
	1995	183348	Judas Cr.	6/4/1996	3/30/1999	4	660	57° 43′	173° 34′
	1996	182554	Michie Cr.	6/11/1997	3/16/2000	4	550	55° 56′	168° 52′
	1997	183159	Judas Cr.	6/12/1998	3/28/2001	4	550	56° 18′	170° 33′
	1999	182353	Wolf Creek	6/10/2000	3/3/2003	4	650	56° 26′	169° 55′
	2000	184412	McClintock R.	6/8/2001	2/15/2002	2	230	56° 10′	166° 00′
	2001	185107	Michie Cr.	6/10/2002	2/8/2003	2	250	56° 44′	167° 00′
	2001	185101	Wolf Cr.	5/23/2002	10/8/2004	3	590	54°01′	166° 29′
	2001	185061	Michie Cr.	6/10/2002	3/15/2005	4	640	57° 21′	171° 39′
	2001	185101	Wolf Cr.	5/23/2002	2/21/2006	5	800	55° 42′	168° 53′
	2005	080166	Wolf Cr.	6/11/2006	2/7/2009	4	630	56° 29′	168° 12′
	2005	080173	McClintock R.	6/14/2006	3/2/2009	4	650	56° 22′	169° 21′
	2005	080169	Mitchie Cr.	6/14/2006	3/26/2010	5	900	57° 07′	172° 26′
Research	2001	185106	Michie Cr.	6/10/2002	10/3/2002	1	193	64° 06′	164° 31′
Trawl	2001	185102	Wolf Cr.	6/2/2002	10/3/2002	1	153	64° 06	164° 31′
	2001	185061	Michie Cr.	6/10/2002	10/4/2002	1	155	63° 00′	165° 58′
	2011	181374	Michie Cr.	6/6/2012	9/22/2012	1	138	61° 29′	167° 00′
	2011	181779	Michie Cr.	6/6/2012	9/24/2012	1	160	64° 06′	163° 33′
	2011	181779	Michie Cr.	6/6/2012	9/24/2012	1	138	60° 59′	168° 00′
	2013	182874	McClintock R.	6/6/2014	9/5/2014	1	126	63° 51′	165° 58′
	2013	183184	Wolf Cr.	6/1/2014	9/6/2014	1	120	63° 01′	166° 03′
	2013	183185	Yukon R.	6/6/2014	9/14/2014	1	192	62° 30′	167° 05′
	2013	183187	Michie Cr.	6/6/2014	9/14/2014	1	177	62° 30′	167° 05′
	2014	183186	Fox Cr.	6/8/2015	9/8/2015	1	109	62° 59′	165° 58′
	2014	183186	Fox Cr.	6/8/2015	9/14/2015	1	120	64° 00′	166° 01′
	2014	183186	Fox Cr.	6/8/2015	9/14/2015	1	124	64° 00′	166° 01′
	2014	184064	McClintock R.	6/3/2015	9/9/2015	1	112	63° 01′	167° 04′
	2014	184065	Michie Cr.	6/3/2015	9/14/2015	1	129	64° 00′	166° 01′

Appendix A19.–Estimated bycatch (numbers) of Pacific salmon by species, and year in United States groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) management area, 1991–2015.

Year	Chinook	Chum	Coho	Sockeye	Pink	Total Non-Chinook
1991	48,880 [a]	28,270 [a]	656 [a]	1,310 [a]	26 [a]	30,262 [a]
1992	41,955	40,090 [a]	1,266 [a]	14 [a]	80 [a]	41,450 [a]
1993	46,014	242,916 [a]	324 [a]	22 [a]	8 [a]	243,270 [a]
1994	43,821	94,107	228	20	193	94,548
1995	23,436	20,983	871	0	21	21,875
1996	63,205	77,819	234	5	2	78,060
1997	50,530	66,816	109	3	66	66,994
1998	55,431	–	–	–	–	66,611
1999	14,599	–	–	–	–	47,234
2000	8,222	–	–	–	–	59,326
2001	40,547	–	–	–	–	60,730
2002	39,683	–	–	–	–	82,482
2003	53,661	–	–	–	–	189,212
2004	60,038	–	–	–	–	462,439
2005	75,084	–	–	–	–	715,628
2006	87,115	–	–	–	–	321,964
2007	130,000	–	–	–	–	96,379
2008	23,914	–	–	–	–	17,040
2009	14,171	–	–	–	–	47,273
2010	12,444	–	–	–	–	13,938
2011	26,609	–	–	–	–	192,496
2012	12,930	–	–	–	–	24,052
2013	16,007	–	–	–	–	126,792
2014	18,096	–	–	–	–	223,853
2015	25,254	–	–	–	–	243,342

Sources: Berger 2010; NMFS web sites:
https://alaskafisheries.noaa.gov/sites/default/files/reports/chinook_salmon_mortality2016.pdf;
https://alaskafisheries.noaa.gov/sites/default/files/reports/chum_salmon_mortality2016.pdf

[a] Community Development Quota (CDQ) bycatch not included.

Appendix A20.–Estimated bycatch (numbers) of Pacific salmon by species and year in United States groundfish fisheries in the Gulf of Alaska (GOA) management area, 1991–2015.

Year	Chinook	Chum	Coho	Sockeye	Pink	Total Non-Chinook
1991	38,893	13,711	1,133	46	64	14,954
1992	16,788	11,140	55	21	0	11,216
1993	19,260	55,268	306	15	799	56,388
1994	13,616	36,782	42	96	306	37,226
1995	14,653	64,067	668	41	16	64,792
1996	15,761	3,969	194	2	11	4,176
1997	15,229	3,349	41	7	23	3,420
1998	16,983	–	–	–	–	13,544
1999	30,600	–	–	–	–	7,529
2000	26,730	–	–	–	–	10,995
2001	15,104	–	–	–	–	6,063
2002	12,919	–	–	–	–	3,219
2003	15,367	–	–	–	–	9,530
2004	17,778	–	–	–	–	5,809
2005	31,271	–	–	–	–	6,608
2006	18,762	–	–	–	–	4,226
2007	40,519	–	–	–	–	3,421
2008	16,264	–	–	–	–	2,156
2009	8,475	–	–	–	–	2,355
2010	54,631	–	–	–	–	NA
2011	21,519	–	–	–	–	NA
2012	20,346	–	–	–	–	NA
2013	23,333	–	–	–	–	NA
2014	15,752	–	–	–	–	NA
2015	18,965	–	–	–	–	NA

Sources: Berger 2010; NMFS https://alaskafisheries.noaa.gov/sites/default/files/reports/goasalmonmort2016.pdf.

Appendix A21.–Estimated bycatch (numbers) of Chinook and non-Chinook salmon in the Bering Sea-Aleutian Islands (BSAI) groundfish fisheries by season, 1991–2015.

	BSAI Chinook Salmon Bycatch				BSAI Non-Chinook Salmon Bycatch			
	A-season		B-season		A-season		B-season	
Year	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries	Pollock Fisheries	All Fisheries
1991	38,791 [a]	46,392 [a]	2,114 [a]	2,488 [a]	2,850 [a]	3,015 [a]	26,101 [a]	27,245 [a]
1992	25,691	31,418	10,259	10,536	1,951 [a]	2,120 [a]	38,324 [a]	39,329 [a]
1993	17,264	24,688	21,252	21,325	1,594 [a]	1,848 [a]	240,597 [a]	241,422 [a]
1994	28,451	38,921	4,686	4,900	3,991	5,599	88,681	88,949
1995	10,579	18,939	4,405	4,497	1,708	3,033	17,556	18,842
1996	36,068	43,316	19,554	19,888	222	665	77,014	77,395
1997	10,935	16,401	33,973	34,129	2,083	2,710	63,904	64,285
1998	15,193	18,930	36,130	36,501	4,002	4,520	60,040	61,177
1999	6,352	8,794	5,627	5,805	362	393	44,810	46,739
2000	3,422	6,568	1,539	1,655	213	350	58,358	58,977
2001	18,484	24,871	14,961	15,676	2,386	2,903	54,621	57,828
2002	21,794	26,277	12,701	13,407	1,377	1,698	79,404	80,785
2003	32,609	40,044	12,977	13,527	3,834	4,113	185,351	187,037
2004	23,093	30,716	28,603	29,248	422	1,028	440,038	449,513
2005	27,331	33,633	40,030	40,632	595	1,030	704,993	708,358
2006	58,391	62,582	24,304	24,502	1,328	2,312	308,318	322,871
2007	69,420	77,119	52,350	52,450	8,524	9,639	85,264	87,709
2008	16,638	18,996	4,842	5,109	322	517	14,947	16,360
2009	9,711	11,010	2,658	2,786	48	163	46,227	46,967
2010	7,630	9,466	2,067	2,917	40	222	13,240	14,201
2011	7,137	7,602	18,362	19,007	297	415	191,138	192,489
2012	7,765	8,984	3,579	3,949	11	308	22,265	24,010
2013	8,237	9,186	4,797	6,826	215	453	125,101	126,526
2014	11,539	13,836	3,492	4,261	577	1,609	218,851	222,519
2015	12,305	17,503	6,025	7,747	4,799	6,203	232,995	237,229

Note: A-season (winter; January 20-June 10) B-season (summer/fall; June 10-November 1). Actual fishing dates when fishing starts and stops varies by year. Source: NMFS https://alaskafisheries.noaa.gov/sites/default/files/reports/chinook_salmon_mortality2016.pdf; https://alaskafisheries.noaa.gov/sites/default/files/reports/chum_salmon_mortality2016.pdf

[a] Community Development Quota (CDQ) bycatch not included.

Appendix A22.–Yukon River fall chum salmon estimated brood year production and return per spawner estimates 1974–2015.

				Estimated Brood Year Return								(R)	(R/P)
	(P)	Estimated Annual Totals		Number of Salmon [a]				Percent				Total Brood	Return/
Year	Escapement [b]	Catch	Run	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Year Return [a]	Spawner
1974	664,300	478,875	1,143,175	112,332	657,675	95,713	0	0.13	0.76	0.11	0.00	865,719	1.30
1975	2,178,000	473,062	2,651,062	198,788	1,707,457	67,490	124.18	0.10	0.87	0.03	0.00	1,973,860	0.91
1976	554,400	339,043	893,443	142,207	645,741	137,839	4,867	0.15	0.69	0.15	0.01	930,654	1.68
1977	730,800	447,918	1,178,718	112,842	1,081,476	198,126	5,003	0.08	0.77	0.14	0.00	1,397,446	1.91
1978	562,900	434,030	996,930	22,352	374,661	108,189	0	0.04	0.74	0.21	0.00	505,202	0.90
1979	1,330,000	615,377	1,945,377	46,365	919,087	311,921	4,039	0.04	0.72	0.24	0.00	1,281,412	0.96
1980	337,700	488,373	826,073	10,006	411,860	216,785	3,822	0.02	0.64	0.34	0.01	642,473	1.90
1981	558,400	683,391	1,241,791	52,142	991,506	340,536	9,513	0.04	0.71	0.24	0.01	1,393,696	2.50
1982	250,500	373,519	624,019	11,751	489,695	178,473	707.49	0.02	0.72	0.26	0.00	680,627	2.72
1983	516,800	525,485	1,042,285	15,375	936,870	232,904	2,391	0.01	0.79	0.20	0.00	1,187,539	2.30
1984	363,600	412,323	775,923	7,587	425,269	180,061	10,049	0.01	0.68	0.29	0.02	622,966	1.71
1985	708,600	515,481	1,224,081	48,604	904,215	319,778	3,209	0.04	0.71	0.25	0.00	1,275,807	1.80
1986	531,400	318,028	849,428	0	507,132	370,290	5,203	0.00	0.57	0.42	0.01	882,625	1.66
1987	726,300	406,143	1,132,443	14,648	620,496	347,585	8,164	0.01	0.63	0.35	0.01	990,893	1.36
1988	353,800	353,685	707,485	41,201	209,478	161,128	12,953 [c]	0.10	0.49	0.38	0.03	424,760	1.20
1989	541,500	545,166	1,086,666	3,280	299,171	410,360 [c]	22,261	0.00	0.41	0.56	0.03	735,073	1.36
1990	499,600	352,007	851,607	750.744	688,958 [c]	459,102	32,549	0.00	0.58	0.39	0.03	1,181,359	2.36
1991	596,100	439,096	1,035,196	4,355 [c]	1,124,363	394,561	12,905	0.00	0.73	0.26	0.01	1,536,184	2.58
1992	416,700	148,846	565,546	7,420	698,733	209,015	4,106	0.01	0.76	0.23	0.00	919,275	2.21
1993	378,200	91,015	469,215	8,279	478,676	107,628	3,221	0.01	0.80	0.18	0.01	597,803	1.58
1994	947,400	169,225	1,116,625	4,584	236,698	148,864	1,689 [c]	0.01	0.60	0.38	0.00	391,835	0.41
1995	1,152,000	461,147	1,613,147	2,492	265,772	72,620 [c]	376.93	0.01	0.78	0.21	0.00	341,260	0.30
1996	873,200	260,923	1,134,123	418,275	174,591 [c]	134,826	8,270	0.00	0.55	0.42	0.03	318,105	0.36
1997	535,100	170,079	705,179	3,253 [c]	241,082	117,980	3,407	0.01	0.66	0.32	0.01	365,722	0.68

-continued-

Appendix A22.–Page 2 of 2.

				Estimated Brood Year Return								(R)	(R/P)
	(P)	Estimated Annual Totals		Number of Salmon [a]				Percent				Total Brood	Return/
Year	Escapement [b]	Catch	Run	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Year Return [a]	Spawner
1998	280,100	70,823	350,923	640.774	268,827	59,262	7,122	0.00	0.80	0.18	0.02	335,853	1.20
1999	287,100	131,175	418,275	29,007	720,974	185,564	13,005	0.03	0.76	0.20	0.01	948,550	3.30
2000	223,600	28,553	252,153	8,636	315,982	109,455	0	0.02	0.73	0.25	0.00	434,073	1.94
2001	331,900	45,026	376,926	144,727	2,044,959	705,047	33,584	0.05	0.70	0.24	0.01	2,928,318	8.82
2002	396,600	27,485	424,085	0	463,822	236,543	13,736	0.00	0.65	0.33	0.02	714,101	1.80
2003	713,200	79,079	792,279	25,317	849,340	456,901	17,416	0.02	0.63	0.34	0.01	1,348,973	1.89
2004	577,100	76,296	653,396	0	349,482	157,953	2,052	0.00	0.69	0.31	0.00	509,486	0.88
2005	1,877,000	290,418	2,167,418	2,385	402,864	93,350	5,354	0.00	0.80	0.19	0.01	503,954	0.27
2006	923,700	270,486	1,194,186	26,487	391,924	344,738	30,300	0.03	0.49	0.43	0.04	793,448	0.86
2007	913,800	205,667	1,119,467	82,579	856,674	190,043	6,817	0.07	0.75	0.17	0.01	1,136,113	1.24
2008	604,400	218,104	822,504	10,100	847,775	421,039	7,812	0.01	0.66	0.33	0.01	1,286,726	2.13
2009	511,400	93,319	604,719	12,070	811,382	424,054	20,567	0.01	0.64	0.33	0.02	1,268,073	2.48
2010	489,900	80,005	569,905	1,988	503,624	219,380	8,797	0.00	0.69	0.30		733,790 [d]	>1.5
2011	891,200	325,666	1,216,866	24,573	432,626	157,208						614,407 [e]	>0.69
2012	683,600	396,589	1,080,189	61,570									
2013	883,600	357,626	1,241,226										
2014	753,400	206,663	960,063										
2015	562,300	281,152	843,452										
Avg. 2014	674,363	302,566	976,930										
Min 2009	223,600	27,485	252,153	0	174,591	59,262	0	0.00	0.41	0.03	0.00	318,105	0.27
Max 2009	2,178,000	683,391	2,651,062	198,788	2,044,959	705,047	33,584	0.15	0.87	0.56	0.04	2,928,318	8.82
	665,200	All Brood Years (1974–2009)		33,694	650,407	241,826	8,794	0.03	0.69	0.27	0.01	934,721	1.76
	520,056	Even Brood Years (1974–2009)		22,582	453,239	207,182	8,069	0.03	0.66	0.30	0.01	691,072	1.51
	810,344	Odd Brood Years (1974–2009)		44,806	847,576	276,469	9,520	0.03	0.71	0.25	0.01	1,178,371	2.01

Note: Minimum and maximum indicate year with the lowest and highest values through 2009. Average value is through the year 2014. Current brood year data are preliminary as is 2015 harvest estimate. In 2015 estimates of drainagewide escapement were based on Bayesian analysis.

[a] The estimated number of salmon which returned are based upon annual age composition observed in Lower Yukon Test Fishery gillnets each year, weighted by test fish catch per unit effort.

[b] Contrast in escapement data are 9.74.

[c] Based upon expanded test fish age composition estimates for years in which the test fishery terminated early both in 1994 and 2000.

[d] Brood year return for 3, 4, and 5 year fish, indicate that production (R/P) from brood year 2010 was at least 1.50. Recruits estimated for incomplete brood year.

[e] Brood year return for 3 and 4 year fish, indicate that production (R/P) from brood year 2011 was at least 0.69. Recruits estimated for incomplete brood year.

Appendix A23.–Escapement, rebuilding and interim goals for Canadian origin Chinook and fall chum salmon stocks, 1985–2016.

	Canadian Origin Stock Targets					
	Chinook Salmon		Fall Chum Salmon			
	Mainstem Escapement	Stabilization/ Rebuilding/	Mainstem Escapement	Stabilization/ Rebuilding/	Fishing Branch	
Year	Goal	Interim Goals	Goal	Interim Goals	Escapement Goal	Interim Goal
1985	33,000-43,000					
1986	33,000-43,000					
1987	33,000-43,000		90,000-135,000		50,000-120,000	
1988	33,000-43,000		90,000-135,000		50,000-120,000	
1989	33,000-43,000		90,000-135,000		50,000-120,000	
1990	33,000-43,000	18,000	80,000		50,000-120,000	
1991	33,000-43,000	18,000	80,000		50,000-120,000	
1992	33,000-43,000	18,000	80,000	51,000	50,000-120,000	
1993	33,000-43,000	18,000	80,000	51,000	50,000-120,000	
1994	33,000-43,000	18,000	80,000	61,000	50,000-120,000	
1995	33,000-43,000	18,000	80,000		50,000-120,000	
1996	33,000-43,000	28,000	80,000	65,000	50,000-120,000	
1997	33,000-43,000	28,000	80,000	49,000	50,000-120,000	
1998	33,000-43,000	28,000	80,000		50,000-120,000	
1999	33,000-43,000	28,000	80,000		50,000-120,000	
2000	33,000-43,000	28,000	80,000		50,000-120,000	
2001	33,000-43,000	28,000	80,000		50,000-120,000	
2002	33,000-43,000	28,000	80,000	60,000	50,000-120,000	
2003 [a]	33,000-43,000	28,000 [b]	80,000	65,000	50,000-120,000	15,000
2004	33,000-43,000	28,000	80,000	65,000	50,000-120,000	13,000
2005	33,000-43,000	28,000	80,000	65,000	50,000-120,000	24,000
2006	33,000-43,000	28,000	80,000		50,000-120,000	28,000
2007	33,000-43,000		80,000		50,000-120,000	34,000
2008	33,000-43,000	45,000 [c]	80,000		50,000-120,000	22,000-49,000 [d]
2009	33,000-43,000	45,000 [c]	80,000		50,000-120,000	22,000-49,000 [d]
2010	33,000-43,000	42,500-55,000 [e]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2011	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2012	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2013	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2014	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2015	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]
2016	33,000-43,000	42,500-55,000 [f]	80,000	70,000-104,000 [f]	50,000-120,000	22,000-49,000 [d]

Note: All single numbers are considered minimums.

[a] Treaty was signed by governments in December 2002.

[b] In 2003 the Chinook salmon goal was set at 25,000. However, if the U.S. conducted a commercial fishery the goal would be increased to 28,000 fish.

[c] Interim management escapement goal (IMEG) using the mainstem Yukon River sonar operated near Eagle estimates of Canadian border passage, previous years were measured by mark–recapture abundance estimates.

[d] Interim Management Escapement Goal (IMEG) established for 2008–2013, by default (no new analysis) recommended in subsequent years.

[e] The IMEG goal of 42,500 to 55,000 was chosen at the Spring 2010 Yukon River Panel meeting to include a precautionary approach to put more large older fish on the spawning grounds. The Panel agreed with 42,500 for the lower end of the range based on an average of the 2 proposed lower goals of 40,000 and 45,000 discussed.

[f] The IMEGs for Chinook salmon from 2010 were recommended to continue in 2016.

Appendix A24.–Fall chum salmon age and sex percentages with average lengths from selected Yukon River escapement projects, 2015.

Location	Sample Size		Age 3	4	5	6	7	Total	Average Length (mm)
Delta River [a]	160	Males	10.6	37.5	17.5	1.9	0.0	67.5	603.2
		Females	5.6	18.1	8.1	0.6	0.0	32.5	571.3
		Total	16.3	55.6	25.6	2.5	0.0	100.0	592.9
Yukon Mainstem [b]	698	Males	1.7	34.7	23.8	1.1	0.0	61.3	584.3
at Eagle, Alaska		Females	1.9	25.6	11.2	0.0	0.0	38.7	619.0
		Total	3.6	60.3	35.0	1.1	0.0	100.0	605.9
									Fork Length (mm)
Fishing Branch	859	Males	2.7	26.5	18.3	0.2	0.0	47.7	678.5
River [c]		Females	3.6	31.2	17.2	0.2	0.0	52.3	626.1
		Total	6.3	57.7	35.5	0.5	0.0	100.0	651.1

[a] Samples were handpicked carcasses from east and middle channels, structure is vertebra.

[b] Samples were from test fishing with drift gillnets, structure is scales.

[c] Samples were collected live at the weir, structure is scales.

APPENDIX B: TABLES

Appendix B1.–Alaska and Canadian total utilization of Yukon River Chinook, chum, and coho salmon, 1961–2015.

	Alaska [a,b]			Canada [c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon [d]	Total	Chinook	Other Salmon	Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,221	19,629	117,226	516,641	633,867
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,324	17,776	109,339	322,826	432,165
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	17,471	23,918	142,638	564,919	707,557
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,182	14,704	104,192	789,340	893,532
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,705	1,307,037	1,383,742	6,000	20,600	26,600	82,705	1,327,637	1,410,342
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091	33,299	170,016	1,281,548	1,451,564

-continued-

Appendix B1.–Page 2 of 3.

	Alaska [a,b]			Canada [c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon [d]	Total	Chinook	Other Salmon	Total
1983	198,436	1,678,597	1,877,033	18,952	29,490	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,325,377	2,473,798	21,427	33,915	55,342	169,848	2,359,292	2,529,140
1989	157,616	2,289,501	2,447,117	17,944	23,490	41,434	175,560	2,312,991	2,488,551
1990	149,433	1,055,515	1,204,948	19,227	34,304	53,531	168,660	1,089,819	1,258,479
1991	154,651	1,335,111	1,489,762	20,607	35,653	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,312	39,215	186,094	884,887	1,070,981
1993	160,289	341,593	501,882	16,611	14,150	30,761	176,900	355,743	532,643
1994	170,829	551,743	722,572	21,198	38,342	59,540	192,027	590,085	782,112
1995	177,663	1,437,870	1,615,533	20,884	46,109	66,993	198,547	1,483,979	1,682,526
1996	139,284	1,121,273	1,260,557	19,612	24,395	44,007	158,896	1,145,668	1,304,564
1997	174,886	545,066	719,952	16,528	15,900	32,428	191,414	560,966	752,380
1998	99,369	199,735	299,104	5,937	8,168	14,105	105,306	207,903	313,209
1999	124,316	236,464	360,780	12,468	19,736	32,204	136,784	256,200	392,984
2000	45,304	106,936	152,240	4,879	9,283	14,162	50,183	116,219	166,402
2001	53,738	116,523	170,261	10,144	9,872	20,016	63,882	126,395	190,277
2002	68,118	122,360	190,478	9,258	8,567	17,825	77,376	130,927	208,303
2003	99,150	199,917	299,067	9,619	11,435	21,054	108,769	211,352	320,121
2004	112,332	206,099	318,431	11,238	9,930	21,168	123,570	216,029	339,599
2005	85,521	478,749	564,270	11,371	18,583	29,954	96,892	497,332	594,224

-continued-

Appendix B1.–Page 3 of 3.

Year	Alaska [a,b]			Canada [c]			Total		
	Chinook	Other Salmon	Total	Chinook	Other Salmon [d]	Total	Chinook	Other Salmon	Total
2006	95,184	528,606	623,790	9,072	11,908	20,980	104,256	540,514	644,770
2007	89,555	532,103	621,658	5,094	14,332	19,426	94,649	546,435	641,084
2008	48,870	481,407	530,277	3,713	9,566	13,279	52,583	490,973	543,556
2009	34,206	355,516	389,722	4,758	2,011	6,769	38,964	357,527	396,491
2010	53,792	393,233	447,025	2,706	5,891	8,597	56,498	399,124	455,622
2011	40,856	762,109	802,965	4,884	8,226	13,110	45,740	770,335	816,075
2012	28,727	912,395	941,122	2,200	7,033	9,233	30,927	919,428	950,355
2013	11,199	1,013,966	1,025,165	2,146	6,170	8,316	13,345	1,020,136	1,033,481
2014	2,724	922,996	925,720	103	5,166	5,269	2,827	928,162	930,989
2015 [e]	6,645	851,211	857,856	1,204	4,423	5,627	7,849	855,634	863,483
Average									
1961–2014	117,965	857,990	975,955	10,775	16,978	27,753	128,740	874,968	1,003,708
2005–2014	49,063	638,123	687,186	4,605	8,889	13,493	53,668	647,011	700,679
2010–2014	27,460	800,952	828,411	2,408	6,497	8,905	29,867	807,449	837,316
Minimum-14	2,724	106,936	152,240	103	2,011	5,269	2,827	116,219	166,402
Maximum-14	198,436	2,325,377	2,473,798	22,846	46,109	66,993	220,511	2,359,292	2,529,140

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe.

[b] Commercial, subsistence, personal-use, test fish retained for subsistence, and sport catches combined. Does not include harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

[c] Catch in number of salmon. Commercial, Aboriginal, domestic, and sport catches combined.

[d] Includes coho salmon harvests in First Nations recreational and commercial fisheries, most of which was harvested in the Old Crow Aboriginal fishery (99.8%).

[e] Data are preliminary.

Appendix B2.–Alaska harvest of Yukon River Chinook salmon, 1961–2015.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
1961	21,488	119,664					141,152	141,152
1962	11,110	94,734					105,844	105,844
1963	24,862	117,048					141,910	141,910
1964	16,231	93,587					109,818	109,818
1965	16,608	118,098					134,706	134,706
1966	11,572	93,315					104,887	104,887
1967	16,448	129,656					146,104	146,104
1968	12,106	106,526					118,632	118,632
1969	14,000	91,027					105,027	105,027
1970	13,874	79,145					93,019	93,019
1971	25,684	110,507					136,191	136,191
1972	20,258	92,840					113,098	113,098
1973	24,317	75,353					99,670	99,670
1974	19,964	98,089					118,053	118,053
1975	12,867	63,838					76,705	76,705
1976	17,806	87,776					105,582	105,582
1977	17,581	96,757				156	114,494	114,494
1978	30,297	99,168				523	129,988	130,476
1979	31,005	127,673				554	159,232	159,232
1980	42,724	153,985				956	197,665	197,665
1981	29,690	158,018				769	188,477	188,477
1982	28,158	123,644				1,006	152,808	152,808
1983	49,478	147,910				1,048	198,436	198,436
1984	42,428	119,904				351	162,683	162,683
1985	39,771	146,188				1,368	187,327	187,327
1986	45,238	99,970				796	146,004	146,004
1987	51,418	134,760 [f]		1,706		502	188,386	188,386

-continued-

Appendix B2.–Page 2 of 3.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
1988	43,907	100,364		2,125	1,081	944	148,421	150,009
1989	48,446	104,198		2,616	1,293	1,063	157,616	157,632
1990	48,587	95,247 [f]	413	2,594	2,048	544	149,433	149,433
1991	46,773	104,878 [f]	1,538		689	773	154,651	154,651
1992	45,626	120,245 [f]	927		962	431	168,191	169,642
1993	62,486	93550	560	426	1572	1,695	160,289	161,718
1994	53,077	113,137	703		1631	2,281	170,829	171,654
1995	48,535	122,728	1,324	399	2,152	2,525	177,663	179,748
1996	43,306	89,671	521	215	1,698	3,873	139,284	141,649
1997	55,978	112,841	769	313	2811	2,174	174,886	176,025
1998	53,733	43618	81	357	926	654	99,369	99,760
1999	52,194	69,275	288	331	1,205	1,023	124,316	125,427
2000	35,841	8,515		75	597	276	45,304	45,867
2001	52,937	[g]		122	-	679	53,738	56,620
2002	42,620	24128	230	126	528	486	68,118	69,240
2003	55,109	40,438		204	680	2,719	99,150	101,000
2004	53,675	56,151		201	792	1,513	112,332	114,370
2005	52,561	32,029		138	310	483	85,521	86,369
2006	47,710	45,829		89	817	739	95,184	96,067
2007	53,976	33,634		136	849	960	89,555	90,753
2008	43,694	4,641		126		409	48,870	50,362
2009	32,900	316		127		863	34,206	35,111
2010	43,259	9,897		162		474	53,792	55,092
2011	40,211	82 [h]		89		474	40,856	41,625
2012	28,311			71		345	28,727	30,486
2013	10,991 [i]			42 [i]		166	11,199	12,741
2014	2,723 [i]			1 [i]		0	2,724	3,287
2015	6,640 [i]			5 [i]		0	6,645	7,611

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
Averages								
1961–2014	34,929	83,106	294	512	839	963	117,965	118,575
2005–2014	35,634	12,643	0	98	198	491	49,063	50,224
2010–2014	25,099	1,996	0	73	0	292	27,460	28,715
Minimum-14	2,723	0	0	1	0	0	2,724	3,287
Maximum-14	62,486	158,018	1,538	2,616	2,811	3,873	198,436	198,436

Note: Minimum and maximum indicate lowest and highest values through 2014.

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes ADF&G test fish sales prior to 1988.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe; including carcasses from subsistence caught fish. These data are only available since 1990.

[d] Prior to 1987, and 1990, 1991, and 1994 personal use was considered part of subsistence.

[e] Yukon Area Total includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1988–1989 and 1992 to present).

[f] Includes Chinook salmon sold illegally.

[g] Summer season commercial fishery was not conducted.

[h] No Chinook salmon were sold in the summer season. A total of 82 Chinook salmon were sold in District 1 and 2 in the fall season.

[i] Data are preliminary.

Appendix B3.–Alaska harvest of Yukon River summer chum salmon, 1970–2015.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
1970	166,504	137,006					303,510	303,510
1971	171,487	100,090					271,577	271,577
1972	108,006	135,668					243,674	243,674
1973	161,012	285,509					446,521	446,521
1974	227,811	589,892					817,703	817,703
1975	211,888	710,295					922,183	922,183
1976	186,872	600,894					787,766	787,766
1977	159,502	534,875				316	694,693	694,693
1978	171,383	1,052,226	25,761			451	1,249,821	1,249,821
1979	155,970	779,316	40,217			328	975,831	975,831
1980	167,705	928,609	139,106			483	1,235,903	1,235,903
1981	117,629	1,006,938	272,763			612	1,397,942	1,397,942
1982	117,413	461,403	255,610			780	835,206	835,206
1983	149,180	744,879	250,590			998	1,145,647	1,145,647
1984	166,630	588,597	277,443			585	1,033,255	1,033,255
1985	157,744	516,997	417,016			1,267	1,093,024	1,093,024
1986	182,337	721,469	467,381			895	1,372,082	1,372,082
1987	170,678	442,238	180,303	4,262		846	798,327	827,995
1988	196,599	1,148,650	468,032	2,225	3,587	1,037	1,820,130	1,851,360
1989	167,155	955,806 [f]	496,934	1,891	10,605	2,132	1,634,523	1,636,864
1990	115,609	302,625	214,552	1,827	8,263	472	643,348	643,348
1991	118,540	349,113 [f]	308,989		3,934	1,037	781,613	781,613
1992	125,497	332,313 [f]	211,264		1,967	1,308	672,349	689,044
1993	104,776	96,522	43,594	674	1,869	564	247,999	268,797
1994	109,904	80,284	178,457		3,212	350	372,207	387,110
1995	118,723	259,774	558,640	780	6,073	1,174	945,164	962,524
1996	102,503	147,127	535,106	905	7,309	1,946	794,896	817,131

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
1997	97,109	95,242	133,010	391	2,590	662	329,004	344,715
1998	86,004	28,611	187	84	3,019	421	118,326	119,688
1999	70,323	29,389	24	382	836	555	101,509	114,970
2000	64,895	6,624	0	30	648	161	72,358	85,535
2001	58,239	- [g]	0	146	0	82	58,467	72,383
2002	72,260	13,558	19	175	218	384	86,614	101,410
2003	68,304	10,685	0	148	119	1,638	80,894	94,862
2004	69,672	26,410	0	231	217	203	96,733	104,995
2005	78,902	41,264	0	152	134	435	120,887	135,244
2006	90,907	92,116	0	262	456	583	184,324	208,495
2007	76,805	198,201	0	184	10	245	275,445	291,566
2008	68,394	151,186	0	138	80	371	220,169	238,289
2009	67,742	170,272	0	308	0	174	238,496	251,293
2010	65,948	232,888	0	319	0	1,183	300,338	322,763
2011	77,715	275,161	0	439	0	294	353,609	371,914
2012	103,751	319,575	0	321	2,412	271	426,330	446,376
2013	91,979 [h]	485,587	0	138 [h]	2,304	1,423	581,431	604,566
2014	67,596 [h]	530,644	0	226 [h]	0	374	598,840	618,144
2015	62,803 [h]	358,856	0	210 [h]	2,494 [i]	709 [j]	425,082	445,550

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales	Sport Fish	Yukon River Total	Yukon Area Total [e]
Averages								
1970–2014	121,902	379,921	147,973	666	2,217	712	617,348	627,167
2005–2014	78,974	249,689	0	249	540	535	329,987	349,185
2010–2014	81,398	368,771	0	289	943	709	452,110	473,392
Minimum-14	58,239	6,624	0	30	0	82	58,467	72,383
Maximum-14	227,811	1,148,650	558,640	4,262	10,605	2,132	1,820,130	1,851,360

Note: Minimum and maximum indicate lowest and highest values through 2014.

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes ADF&G test fish sales prior to 1988.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses from subsistence caught fish. These data are only available since 1990. In JTC reports prior to 2009 subsistence plus commercial related harvests are noted as subsistence "use".

[d] Prior to 1987, 1990, 1991, and 1994 personal use was considered part of subsistence.

[e] Yukon Area Total includes subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay (1978, 1987–1989 and 1992 to present).

[f] Includes illegal sales of summer chum salmon.

[g] Summer season commercial fishery was not conducted.

[h] Data are preliminary.

[i] Test fish sales includes Lower Yukon Test Fishery and Purse Seine Test Fishery sales.

[j] Data are unavailable at this time. Estimated based on the previous 5-year average.

Appendix B4.–Alaska harvest of Yukon River fall chum salmon, 1961–2015.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
1961	101,772 [g, h]	42,461	0			144,233	144,233
1962	87,285 [g, h]	53,116	0			140,401	140,401
1963	99,031 [g, h]		0			99,031	99,031
1964	120,360 [g, h]	8,347	0			128,707	128,707
1965	112,283 [g, h]	23,317	0			135,600	135,600
1966	51,503 [g, h]	71,045	0			122,548	122,548
1967	68,744 [g, h]	38,274	0			107,018	107,018
1968	44,627 [g, h]	52,925	0			97,552	97,552
1969	52,063 [g, h]	131,310	0			183,373	183,373
1970	55,501 [g, h]	209,595	0			265,096	265,096
1971	57,162 [g, h]	189,594	0			246,756	246,756
1972	36,002 [g, h]	152,176	0			188,178	188,178
1973	53,670 [g, h]	232,090	0			285,760	285,760
1974	93,776 [g, h]	289,776	0			383,552	383,552
1975	86,591 [g, h]	275,009	0			361,600	361,600
1976	72,327 [g, h]	156,390	0			228,717	228,717
1977	82,771 [h]	257,986	0			340,757	340,757
1978	84,239 [h]	236,383	10,628			331,250	331,915
1979	214,881	359,946	18,466			593,293	593,293
1980	167,637	293,430	5,020			466,087	466,087
1981	177,240	466,451	11,285			654,976	654,976
1982	132,092	224,187	805			357,084	357,084
1983	187,864	302,598	5,064			495,526	495,526
1984	172,495	208,232	2,328			383,055	383,055
1985	203,947	267,744	2,525			474,216	474,216
1986	163,466	139,442	577			303,485	303,485
1987	342,597 [i]	[j]		19,066		361,663	361,885

-continued-

Appendix B4.–Page 2 of 3.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
1988	151,586	133,763	3,227	3881	27,663	320,120	322,382
1989	211,147	270,195	14,749	5082	20,973	522,146	522,302
1990	167,900	124,174	12,168	5176	9,224	318,642	318,642
1991	145,524	230,852	23,366	0	3,936	403,678	403,678
1992	107,602	15,721 [k]	3,301	0	1,407	128,031	128,237
1993	76,762	[j]		163	0	76,925	77,045
1994	123,218	3,631	4,368	0	0	131,217	131,564
1995	130,506	250,766	32,324	863	1,121	415,580	415,934
1996	128,866	88,342	17,288	356	1,717	236,569	236,961
1997	95,141	56,713	1,474	284	867	154,479	154,479
1998	62,867	[j]		2	0	62,869	62,903
1999	89,736	20,371	0	261	1,171	111,539	111,743
2000	19,306	[j]		1	0	19,307	19,396
2001	35,144	[j]		10	0	35,154	35,713
2002	19,390	[j]		3	0	19,393	19,677
2003	56,784	10,996	0	394	0	68,174	68,320
2004	62,206	4,110	0	230	0	66,546	66,866
2005	91,464	180,249	0	133	0	271,846	271,916
2006	83,815	174,542	0	333	0	258,690	258,877
2007	100,987	90,677	0	173	0	191,837	192,071
2008	88,971	119,265	0	181	0	208,417	208,803
2009	65,961	25,269	0	78	0	91,308	91,466
2010	68,459	2,550	0	3,209	0	74,218	74,404
2011	79,887	238,979	0	347	0	319,213	319,528
2012	99,298	289,692	0	410	166	389,566	389,577
2013	113,235 [l]	238,051	0	383 [l]	121	351,790	351,939
2014	84,230 [l]	115,593	0	287 [l]	30	200,140	200,392
2015	86,143 [l]	191,470	0	80 [l]	50	277,743	277,941

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
Averages							
1961–2014	105,221	156,743	3,520	1,475	2,536	246,807	246,961
2005–2014	87,631	147,547	0	553	40	235,772	235,967
2010–2014	89,022	176,973	0	927	63	266,985	267,168
Minimum-14	19,306	2,550	0	0	0	19,307	19,396
Maximum-14	342,597	466,451	32,324	19,066	27,663	654,976	654,976

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes fish sold in the round and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et. al 1992). Includes ADF&G test fish prior to 1988. Beginning in 1999 commercial harvest may include some commercial related harvest.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. In prior JTC reports subsistence plus commercial related harvests are noted as subsistence "use".

[d] Prior to 1987, and in 1991, 1992 and 1994 personal use was considered part of subsistence.

[e] Test fish sales is the number of salmon sold by ADF&G test fisheries.

[f] Yukon Area Total includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987–1989 and 1992 to present).

[g] Catches estimated because harvests of species other than Chinook salmon were not differentiated.

[h] Minimum estimates from 1961-1978 because subsistence surveys were conducted prior to the end of the fishing season.

[i] Includes an estimated 95,768 and 119,168 fall chum salmon illegally sold in Districts 5 (Yukon River) and 6 (Tanana River), respectively.

[j] Commercial fishery was not conducted.

[k] Commercial fishery operated only in District 6, the Tanana River.

[l] Data are preliminary.

Appendix B5.–Alaska harvest of Yukon River coho salmon, 1961–2015.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1961	9,192 [h, i]	2,855	0				12,047	12,047
1962	9,480 [h, i]	22,926	0				32,406	32,406
1963	27,699 [h, i]	5,572	0				33,271	33,271
1964	12,187 [h, i]	2,446	0				14,633	14,633
1965	11,789 [h, i]	350	0				12,139	12,139
1966	13,192 [h, i]	19,254	0				32,446	32,446
1967	17,164 [h, i]	11,047	0				28,211	28,211
1968	11,613 [h, i]	13,303	0				24,916	24,916
1969	7,776 [h, i]	15,093	0				22,869	22,869
1970	3,966 [h, i]	13,188	0				17,154	17,154
1971	16,912 [h, i]	12,203	0				29,115	29,115
1972	7,532 [h, i]	22,233	0				29,765	29,765
1973	10,236 [h, i]	36,641	0				46,877	46,877
1974	11,646 [h, i]	16,777	0				28,423	28,423
1975	20,708 [h, i]	2,546	0				23,254	23,254
1976	5,241 [h, i]	5,184	0				10,425	10,425
1977	16,333 [i]	38,863	0			112	55,308	55,308
1978	7,787 [i]	26,152	0			302	34,241	34,330
1979	9,794	17,165	0			50	27,009	27,009
1980	20,158	8,745	0			67	28,970	28,970
1981	21,228	23,680	0			45	44,953	44,953
1982	35,894	37,176	0			97	73,167	73,167
1983	23,905	13,320	0			199	37,424	37,424
1984	49,020	81,940	0			831	131,791	131,791
1985	32,264	57,672	0			808	90,744	90,744
1986	34,468	47,255	0			1,535	83,258	83,258
1987	82,371 [j]	[k]		2,523		1,292	86,186	86,186

-continued-

Appendix B5.–Page 2 of 3.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1988	67,830	99,907	0	1,250	13,720	2,420	185,127	186,976
1989	40,711	85,493	0	872	3,945	1,811	132,832	133,045
1990	43,460	41,032	3,255	1,181	2,650	1,947	93,525	93,525
1991	37,388	103,180	3,506	0	2,971	2,775	149,820	149,820
1992	51,921	6,556 [l]	1,423	0	1,629	1,666	63,195	63,254
1993	15,772	[k]		0	0	897	16,669	16,709
1994	41,694	120	4,331	0	0	2,174	48,319	48,400
1995	28,225	45,939	1,074	417	193	1,278	77,126	77,278
1996	30,312	52,643	3,339	198	1,728	1,588	89,808	89,900
1997	23,945	35,320	0	350	498	1,470	61,583	61,583
1998	17,772	1	0	9	0	758	18,540	18,889
1999	20,823	1,601	0	147	236	609	23,416	23,484
2000	14,717	[k]		0	0	554	15,271	15,493
2001	21,620	[k]		34	0	1,248	22,902	23,404
2002	15,241	[k]		20	0	1,092	16,353	16,601
2003	23,580	25,243	0	549	0	1,477	50,849	51,141
2004	20,732	20,232	0	233	0	1,623	42,820	42,883
2005	26,971	58,311	0	107	0	627	86,016	86,295
2006	19,371	64,942	0	279	0	1,000	85,592	85,927
2007	19,514	44,575	0	135	0	597	64,821	64,931
2008	16,739	35,691	0	50	0	341	52,821	52,937
2009	15,760	8,026	0	70	0	964	24,820	25,066
2010	12,921	3,750	0	1,062	0	944	18,677	18,801
2011	12,289	76,303	0	232	0	463	89,287	89,342
2012	21,440	74,789	0	100	39	131	96,499	96,592
2013	14,170 [m]	66,199	0	109 [m]	1	266	80,745	81,032
2014	17,348 [m]	104,638	0	175 [m]	0	1,855	124,016	124,220
2015	17,914 [m]	129,700	0	145 [m]	8	732 [n]	148,499	148,673

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
Averages								
1961–2014	22,626	32,824	345	361	1,023	998	54,125	54,239
2005–2014	17,652	53,751	0	232	4	719	72,358	72,543
2010–2014	15,634	65,136	0	336	8	732	81,845	81,997
Minimum-14	3,966	1	0	0	0	45	10,425	10,425
Maximum-14	82,371	104,638	4,331	2,523	13,720	2,775	185,127	186,976

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes fish sold in the round and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area Annual Management Report). Includes ADF&G test fish prior to 1988. Beginning in 1999 commercial harvest may include some commercial related harvest.

[c] Includes an estimate of number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence.

[d] Prior to 1987, and 1991, 1992 and 1994 personal use was considered part of subsistence.

[e] Test fish sales is the number of salmon sold by ADF&G test fisheries.

[f] The majority of the sport-fish harvest is taken in the Tanana River drainage (see Brase and Baker 2012 and Burr 2012).

[g] Yukon Area Total includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1988–1989 and 1992 to present).

[h] Catches estimated because harvests of species other than Chinook salmon were not differentiated.

[i] Minimum estimates from 1961-1978 because subsistence surveys were conducted prior to the end of the fishing season.

[j] Includes an estimated 5,015 and 31,276 coho salmon illegally sold in Districts 5 (Yukon River) and 6 (Tanana River), respectively.

[k] Commercial fishery was not conducted.

[l] Commercial fishery operated only in District 6, the Tanana River.

[m] Data are preliminary.

[n] Data are unavailable at this time. Estimate based on the previous 5-year average.

Appendix B6.–Alaska and Canadian total utilization of Yukon River Chinook and fall chum salmon, 1961–2015.

	Chinook Salmon			Fall Chum Salmon		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
1961	13,246	141,152	154,398	9,076	144,233	153,309
1962	13,937	105,844	119,781	9,436	140,401	149,837
1963	10,077	141,910	151,987	27,696	99,031 [d]	126,727
1964	7,408	109,818	117,226	12,187	128,707	140,894
1965	5,380	134,706	140,086	11,789	135,600	147,389
1966	4,452	104,887	109,339	13,192	122,548	135,740
1967	5,150	146,104	151,254	16,961	107,018	123,979
1968	5,042	118,632	123,674	11,633	97,552	109,185
1969	2,624	105,027	107,651	7,776	183,373	191,149
1970	4,663	93,019	97,682	3,711	265,096	268,807
1971	6,447	136,191	142,638	16,911	246,756	263,667
1972	5,729	113,098	118,827	7,532	188,178	195,710
1973	4,522	99,670	104,192	10,135	285,760	295,895
1974	5,631	118,053	123,684	11,646	383,552	395,198
1975	6,000	76,705	82,705	20,600	361,600	382,200
1976	5,025	105,582	110,607	5,200	228,717	233,917
1977	7,527	114,494	122,021	12,479	340,757	353,236
1978	5,881	129,988	135,869	9,566	331,250	340,816
1979	10,375	159,232	169,607	22,084	593,293	615,377
1980	22,846	197,665	220,511	22,218	466,087	488,305
1981	18,109	188,477	206,586	22,281	654,976	677,257
1982	17,208	152,808	170,016	16,091	357,084	373,175
1983	18,952	198,436	217,388	29,490	495,526	525,016
1984	16,795	162,683	179,478	29,267	383,055	412,322
1985	19,301	187,327	206,628	41,265	474,216	515,481
1986	20,364	146,004	166,368	14,543	303,485	318,028
1987	17,614	188,386	206,000	44,480	361,663 [d]	406,143
1988	21,427	148,421	169,848	33,565	320,120	353,685
1989	17,944	157,616	175,560	23,020	522,146	545,166
1990	19,227	149,433	168,660	33,622	318,642	352,264
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [e]	148,846
1993	16,611	160,289	176,900	14,090	76,925 [d]	91,015
1994	21,198	170,829	192,027	38,008	131,217	169,225
1995	20,884	177,663	198,547	45,600	415,580	461,180
1996	19,612	139,284	158,896	24,354	236,569	260,923
1997	16,528	174,886	191,414	15,600	154,479	170,079
1998	5,937	99,369	105,306	7,954	62,869	70,823
1999	12,468	124,316	136,784	19,636	111,539	131,175

-continued-

	Chinook Salmon			Fall Chum Salmon		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
2000	4,879	45,304	50,183	9,246	19,307 [d]	28,553
2001	10,144	53,738 [f]	63,882	9,872	35,154 [d]	45,026
2002	9,258	68,118	77,376	8,092	19,393 [d]	27,485
2003	9,619	99,150	108,769	10,905	68,174	79,079
2004	11,238	112,332	123,570	9,750	66,546	76,296
2005	11,371	85,521	96,892	18,572	271,933	290,505
2006	9,072	95,184	104,256	11,796	258,690	270,486
2007	5,094	89,555	94,649	13,830	191,837	205,667
2008	3,713	48,870	52,583	9,566	208,417	217,983
2009	4,758	34,206	38,964	2,011	91,915	93,926
2010	2,706	53,792	56,498	5,787	74,218	80,005
2011	4,884	40,856	45,740	8,163	319,213	327,376
2012	2,200	28,727	30,927	7,023	389,566	396,589
2013	2,146	11,199	13,345	6,170	351,790	357,960
2014 [g]	103	2,724	2,827	5,033	200,140	205,173
2015 [g]	1,204	6,645	7,849	4,453	277,743	282,196
Averages						
1961–2014	10,775	117,965	128,740	16,792	246,807	263,599
2005–2014	4,605	49,063	53,668	8,795	235,772	244,567
2010–2014	2,408	27,460	29,867	6,435	266,985	273,421
Minimum-14	103	2,724	2,827	2,011	19,307	27,485
Maximum-14	22,846	198,436	220,511	45,600	654,976	677,257

Note: Minimum and maximum indicate year with the lowest and highest values through 2014. Canadian managers sometimes do not refer to chum as fall chum salmon since they only have one run.

[a] Catches in number of salmon. Includes commercial, Aboriginal, domestic, and sport catches combined.

[b] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area Annual Management Report).

[c] Commercial, subsistence, personal-use, test fish, and sport catches combined. Does not include the subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

[d] Commercial fishery did not operate within the Alaska portion of the drainage.

[e] Commercial fishery operated only in District 6, the Tanana River.

[f] No commercial fishery was conducted during the summer season.

[g] Data are preliminary.

Appendix B7.–Canadian catch of Yukon River Chinook salmon, 1961–2015.

	Mainstem Yukon River Harvest							Porcupine River	
Year	Commercial	Domestic	Aboriginal Fishery	Recreational [a]	Test Fishery	Combined Non-Commercial	Total	Aboriginal Fishery Harvest	Total Canadian Harvest
1961	3,446		9,300			9,300	12,746	500	13,246
1962	4,037		9,300			9,300	13,337	600	13,937
1963	2,283		7,750			7,750	10,033	44	10,077
1964	3,208		4,124			4,124	7,332	76	7,408
1965	2,265		3,021			3,021	5,286	94	5,380
1966	1,942		2,445			2,445	4,387	65	4,452
1967	2,187		2,920			2,920	5,107	43	5,150
1968	2,212		2,800			2,800	5,012	30	5,042
1969	1,640		957			957	2,597	27	2,624
1970	2,611		2,044			2,044	4,655	8	4,663
1971	3,178		3,260			3,260	6,438	9	6,447
1972	1,769		3,960			3,960	5,729		5,729
1973	2,199		2,319			2,319	4,518	4	4,522
1974	1,808	406	3,342			3,748	5,556	75	5,631
1975	3,000	400	2,500			2,900	5,900	100	6,000
1976	3,500	500	1,000			1,500	5,000	25	5,025
1977	4,720	531	2,247			2,778	7,498	29	7,527
1978	2,975	421	2,485			2,906	5,881		5,881
1979	6,175	1,200	3,000			4,200	10,375		10,375
1980	9,500	3,500	7,546	300		11,346	20,846	2,000	22,846
1981	8,593	237	8,879	300		9,416	18,009	100	18,109
1982	8,640	435	7,433	300		8,168	16,808	400	17,208
1983	13,027	400	5,025	300		5,725	18,752	200	18,952
1984	9,885	260	5,850	300		6,410	16,295	500	16,795
1985	12,573	478	5,800	300		6,578	19,151	150	19,301
1986	10,797	342	8,625	300		9,267	20,064	300	20,364
1987	10,864	330	6,069	300		6,699	17,563	51	17,614
1988	13,217	282	7,178	650		8,110	21,327	100	21,427
1989	9,789	400	6,930	300		7,630	17,419	525	17,944
1990	11,324	247	7,109	300		7,656	18,980	247	19,227
1991	10,906	227	9,011	300		9,538	20,444	163	20,607
1992	10,877	277	6,349	300		6,926	17,803	100	17,903

-continued-

Appendix B7.–Page 2 of 3.

Year	Mainstem Yukon River Harvest							Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Recreational [a]	Test Fishery	Combined Non-Commercial	Total		
1993	10,350	243	5,576	300		6,119	16,469	142	16,611
1994	12,028	373	8,069	300		8,742	20,770	428	21,198
1995	11,146	300	7,942	700		8,942	20,088	796	20,884
1996	10,164	141	8,451	790		9,382	19,546	66	19,612
1997	5,311	288	8,888	1,230		10,406	15,717	811	16,528
1998	390	24	4,687	-	737	5,448	5,838	99	5,937
1999	3,160	213	8,804	177		9,194	12,354	114	12,468
2000	-	-	4,068	-	761	4,829	4,829	50	4,879
2001	1,351	89	7,421	146	767	8,423	9,774	370	10,144
2002	708	59	7,139	128	1,036	8,362	9,070	188	9,258
2003	2,672	115	6,121	275	263	6,774	9,446	173	9,619
2004	3,785	88	6,483	423	167	7,161	10,946	292	11,238
2005	4,066	99	6,376	436		6,911	10,977	394	11,371
2006	2,332	63	5,757	606		6,426	8,758	314	9,072
2007	-	-	4,175	2 [b]	617	4,794	4,794	300	5,094
2008	1 [c]	-	2,885	-	513	3,398	3,399	314	3,713
2009	364	17	3,791	125	-	3,933	4,297	461	4,758
2010	-	-	2,455 [d]	1 [e]	-	2,456	2,456	250	2,706
2011	4 [c]	-	4,550 [d]	40	-	4,590	4,594	290	4,884
2012	-	-	2,000 [d]	-	-	2,000	2,000	200	2,200
2013	2 [c]	-	1,902 [d]	-	-	1,902	1,902	242	2,144
2014	-	-	100	-	-	100	100	3	103
2015	- [c]	-	1,000 [f]	-	-	1,000	1,000	204	1,204
Averages									
1961–2014	5,717 [g]	393	5,152	342	608	5,667	10,537	252	10,775
2005–2014	2,254 [g]	60	3,399	202	565	3,651	4,328	277	4,605
2010–2014	- [g]	-	2,201	21	-	2,210	2,210	197	2,407
Minimum-14	1	17	100	1	167	100	100	3	103
Maximum-14	13,217	3,500	9,300	1,230	1,036	11,346	21,327	2,000	22,846

-continued-

Note: Minimum and maximum indicate year with the lowest and highest values through 2014. Dash means fishery did not occur.

[a] Recreational harvest unknown before 1980.

[b] Recreational fishery involved non-retention of Chinook salmon for most of the season thus effectively closed.

[c] Closed during Chinook salmon season, harvested in chum salmon fishery.

[d] Adjusted to account for underreporting.

[e] Fishery was closed, one fish mistakenly caught and retained.

[f] Data are preliminary.

[g] Excluding years when no directed fishery occurred.

Appendix B8.–Canadian catch of Yukon River fall chum salmon, 1961–2015.

	Mainstem Yukon River Harvest						Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
Year	Commercial	Domestic	Aboriginal Fishery	Test Fishery	Combined Non-Commercial [a]	Total [a]		
1961	3,276		3,800		3,800	7,076	2,000	9,076
1962	936		6,500		6,500	7,436	2,000	9,436
1963	2,196		5,500		5,500	7,696	20,000	27,696
1964	1,929		4,200		4,200	6,129	6,058	12,187
1965	2,071		2,183		2,183	4,254	7,535	11,789
1966	3,157		1,430		1,430	4,587	8,605	13,192
1967	3,343		1,850		1,850	5,193	11,768	16,961
1968	453		1,180		1,180	1,633	10,000	11,633
1969	2,279		2,120		2,120	4,399	3,377	7,776
1970	2,479		612		612	3,091	620	3,711
1971	1,761		150		150	1,911	15,000	16,911
1972	2,532				0	2,532	5,000	7,532
1973	2,806		1,129		1,129	3,935	6,200	10,135
1974	2,544	466	1,636		2,102	4,646	7,000	11,646
1975	2,500	4,600	2,500		7,100	9,600	11,000	20,600
1976	1,000	1,000	100		1,100	2,100	3,100	5,200
1977	3,990	1,499	1,430		2,929	6,919	5,560	12,479
1978	3,356	728	482		1,210	4,566	5,000	9,566
1979	9,084	2,000	11,000		13,000	22,084		22,084
1980	9,000	4,000	3,218		7,218	16,218	6,000	22,218
1981	15,260	1,611	2,410		4,021	19,281	3,000	22,281
1982	11,312	683	3,096		3,779	15,091	1,000	16,091
1983	25,990	300	1,200		1,500	27,490	2,000	29,490
1984	22,932	535	1,800		2,335	25,267	4,000	29,267
1985	35,746	279	1,740		2,019	37,765	3,500	41,265
1986	11,464	222	2,200		2,422	13,886	657	14,543
1987	40,591	132	3,622		3,754	44,345	135	44,480
1988	30,263	349	1,882		2,231	32,494	1,071	33,565
1989	17,549	100	2,462		2,562	20,111	2,909	23,020
1990	27,537	0	3,675		3,675	31,212	2,410	33,622
1991	31,404	0	2,438		2,438	33,842	1,576	35,418
1992	18,576	0	304		304	18,880	1,935	20,815
1993	7,762	0	4,660		4,660	12,422	1,668	14,090

-continued-

Appendix B8.–Page 2 of 2.

	Mainstem Yukon River Harvest						Porcupine River Aboriginal Fishery	Total Canadian
Year	Commercial	Domestic	Aboriginal Fishery	Test Fishery	Combined Non-Commercial [a]	Total [a]	Harvest	Harvest
1994	30,035	0	5,319		5,319	35,354	2,654	38,008
1995	39,012	0	1,099		1,099	40,111	5,489	45,600
1996	20,069	0	1,260		1,260	21,329	3,025	24,354
1997	8,068	0	1,238		1,238	9,306	6,294	15,600
1998 [b]	-		1,795		1,795	1,795	6,159	7,954
1999	10,402	0	3,234		3,234	13,636	6,000	19,636
2000	1,319	0	2,927		2,927	4,246	5,000	9,246
2001	2,198	3	3,077	1 [b]	3,080	5,278	4,594	9,872
2002	3,065	0	3,167	2,756 [b]	3,167	6,232	1,860	8,092
2003	9,030	0	1,493	990 [b]	1,493	10,523	382	10,905
2004	7,365	0	2,180	995 [b]	2,180	9,545	205	9,750
2005	11,931	13	2,035		2,048	13,979	4,593	18,572
2006	4,096	0	2,521		2,521	6,617	5,179	11,796
2007	7,109	0	2,221	3,765 [b]	2,221	9,330	4,500	13,830
2008	4,062	0	2,068		2,068	6,130	3,436	9,566
2009	293	0	820		820	1,113	898	2,011
2010	2,186	0	1,523 [c]		1,523	3,709	2,078	5,787
2011	5,312	0	1,000 [c]		1,000	6,312	1,851	8,163
2012	3,205	0	700 [c]		700	3,905	3,118	7,023
2013	3,369	18	500 [c]		518	3,887	2,283	6,170
2014	2,485	19	546		565	3,050	1,983	5,033
2015	2,862 [d]	35	1,000 [d]		1,035	3,897	556 [d]	4,453
Averages								
1961–2014	10,032	464	2,325	1,701	2,626	12,472	4,401	16,792
2005–2014	4,405	5	1,393	3,765	1,398	5,803	2,992	8,795
2010–2014	3,311	7	854	na	861	4,173	2,263	6,435
Minimum-14	293	0	100	1	0	1,113	135	2,011
Maximum-14	40,591	4,600	11,000	3,765	13,000	44,345	20,000	45,600

Note: Minimum and maximum indicate year with the lowest and highest values through 2014. Dash means fishery did not occur.

[a] Test fishery was not included in totals as it was live-release.

[b] The chum salmon test fishery practiced live-release.

[c] Adjusted to account for underreporting.

[d] Data are preliminary.

Appendix B9.–Chinook salmon aerial survey indices for selected spawning areas in the Alaska portion of the Yukon River drainage, 1961–2015.

	Andreafsky River		Anvik River		Nulato River			Gisasa River
Year	East Fork	West Fork	Drainagewide Total	Index Area [a]	North Fork [b]	South Fork	Both Forks	
1961	1,003		1,226		376 [c]	167	543	266 [c]
1962	675 [c]	762 [c]						
1963								
1964	867	705						
1965		355 [c]	650 [c]					
1966	361	303	638					
1967		276 [c]	336 [c]					
1968	380	383	310 [c]					
1969	231 [c]	231 [c]	296 [c]					
1970	665	574 [c]	368					
1971	1,904	1,682						
1972	798	582 [c]	1,198					
1973	825	788	613					
1974		285	471 [c]		55 [c]	23 [c]	78 [c]	161
1975	993	301	730		123	81	204	385
1976	818	643	1,053		471	177	648	332
1977	2,008	1,499	1,371		286	201	487	255
1978	2,487	1,062	1,324		498	422	920	45 [c]
1979	1,180	1,134	1,484		1,093	414	1,507	484
1980	958 [c]	1,500	1,330	1,192	954 [c]	369 [c]	1,323 [c]	951
1981	2,146 [c]	231 [c]	807 [c]	577 [c]		791	791	
1982	1,274	851						421
1983			653 [c]	376 [c]	526	480	1,006	572
1984	1,573 [c]	1,993	641 [c]	574 [c]				
1985	1,617	2,248	1,051	720	1,600	1,180	2,780	735
1986	1,954	3,158	1,118	918	1,452	1,522	2,974	1,346
1987	1,608	3,281	1,174	879	1,145	493	1,638	731
1988	1,020	1,448	1,805	1,449	1,061	714	1,775	797
1989	1,399	1,089	442 [c]	212 [c]				
1990	2,503	1,545	2,347	1,595	568 [c]	430 [c]	998 [c]	884 [c]
1991	1,938	2,544	875 [c]	625 [c]	767	1,253	2,020	1,690
1992	1,030 [c]	2,002 [c]	1,536	931	348	231	579	910
1993	5,855	2,765	1,720	1,526	1,844	1,181	3,025	1,573
1994	300 [c]	213 [c]		913 [c]	843	952	1,795	2,775
1995	1,635	1,108	1,996	1,147	968	681	1,649	410
1996		624	839	709		100	100	
1997	1,140	1,510	3,979	2,690				144 [c]
1998	1,027	1,249 [c]	709 [c]	648 [c]	507	546	1,053	889 [c]

-continued-

Appendix B9.–Page 2 of 2.

	Andreafsky River		Anvik River		Nulato River			Gisasa River	
Year	East Fork	West Fork	Drainagewide Total	Index Area [a]	North Fork [b]	South Fork	Both Forks		
1999		870 [c]	950 [c]	950 [c]		[c]	[c]		[c]
2000	1,018		1,721	1,394		[c]	[c]		[c]
2001	1,059	565	1,420	1,177	1,116	768	1,884 [d]	1,298	[c]
2002	1,447	917	1,713	1,329	687	897	1,584	506	
2003	1,116 [c]	1,578	973 [c]	973 [c]		[c]	[c]		
2004	2,879	1,317	3,679	3,304	856	465	1,321	731	
2005	1,715	1,492	2,421	1,922	323	230	553	958	
2006	591 [c]	824	1,886	1,776 [e]	620	672	1,292	843	
2007	1,758	976	1,529	1,497	1,928	1078	2,583	593	
2008	278 [c]	262 [c]	992 [c]	827 [c]	463	543	922	487	
2009	84 [c]	1,678	832	590	1,418	842	2,260	515	
2010	537 [c]	858	974	721	356	355	711	264	
2011	620	1,173	642	501	788	613	1,401	906	
2012		227 [c]	722	451	682	692	1,374		[c]
2013	1,441	1,094	940	656	586	532	1,118	201	[c]
2014		1,695	1,584	800		[c]	[c]	[c]	[c]
2015	2,167	1,356	2,616		999	565	1,564	558	
SEG [f]		[g] 640-1,600	1,100-1,700				940-1,900		[h]
Averages									
1961–2014	1,306	1,130	1,180	1,075	789	580	1,320	723	
2005–2014	878	1,028	1,252	974	796	617	1,357	596	
2010–2014	866	1,009	972	626	603	548	1,151	457	
Minimum-14	84	213	222	212	55	23	78	45	
Maximum-14	5,855	3,281	3,979	3,304	1,928	1,522	3,025	2,775	

Note: Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted. Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Anvik River Index Area includes mainstem counts between Yellow River and McDonald Creek.

[b] Nulato River mainstem aerial survey counts below the forks are included with the North Fork.

[c] Incomplete, poor timing and/or poor survey conditions resulting in minimal, inaccurate, or no counts.

[d] In 2001, the Nulato River escapement goal was established for both forks combined.

[e] Index area includes counts from Beaver Creek to McDonald Creek.

[f] Sustainable Escapement Goal.

[g] Aerial escapement goal for Andreafsky River was discontinued in 2010. Note: weir-based goal replaced East Fork Andreafsky River aerial survey goal.

[h] Gisasa River aerial escapement goal was discontinued in 2010. Weir-based goal replaced East Fork Andreafsky River aerial survey goal.

Appendix B10.–Chinook salmon escapement counts and percentage females counted for selected spawning areas in the Alaska portion of the Yukon River drainage, 1986–2015.

	Andreafsky River Weir		Nulato River Tower	Henshaw Creek Weir		Gisasa River Weir		Chena River Tower		Salcha River Tower	
Year	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No.Fish	% Fem. [a]	No. Fish	% Fem. [a]
1986	1,530	23.3 [b]						9,065 [c]	25.4		
1987	2,011	56.1 [b]						6,404 [c]	48.2	4,771 [c]	52.0
1988	1,341	38.7 [b]						3,346 [c]	33.9	4,322 [c]	45.3
1989		13.6						2,730 [c]	45.3	3,294 [c]	43.8
1990		41.6						5,603 [c]	36.3	10,728 [c]	36.2
1991		33.9						3,172 [c]	31.5	5,608 [c]	40.7
1992		21.2						5,580 [c]	21.6	7,862 [c]	36.0
1993		29.9						12,241	11.7	10,007	23.9
1994	7,801	35.5	1,795			2,888		11,877	32.4	18,399	38.8
1995	5,841	43.7	1,412			4,023	46.0	11,394 [c]	51.7	13,643	48.5
1996	2,955	41.9	756			1,991	19.5	7,153 [c]	26.8	7,570 [c]	26.2
1997	3,186	36.8	4,766			3,764	26.0	13,390	25.6	18,514	43.4
1998	4,034	29.0	1,536			2,414	16.2	4,745	28.4	5,027	26.1
1999	3,444	28.6	1,932			2,644	26.4	6,485	45.6	9,198	47.4
2000	1,609	54.3	908	244	29.7	2,089	34.4	4,694 [c]	21.7	4,595	38.1
2001	1,148			1,103	36.3	3,052	49.2	9,696	30.1	13,328	32.5
2002	4,123	21.1 [d]	2,696	649	30.8	2,025	20.7	6,967 [c]	27.3	9,000 [e]	30.1
2003	4,336	45.3	1,716 [f]	763	38.4	1,901	38.1	11,100	31.8	15,500 [e]	34.3
2004	8,045	37.3		1,248	21.3	1,774	30.1	9,645	43.9	15,761	54.5
2005	2,239	50.2		1,059	41.4	3,111	34.0		30.6	5,988	47.1

-continued-

Appendix B10.–Page 2 of 3.

Year	Andreafsky River Weir No. Fish	Andreafsky River Weir % Fem.	Nulato River Tower No. Fish	Henshaw Creek Weir No. Fish	Henshaw Creek Weir % Fem.	Gisasa River Weir No. Fish	Gisasa River Weir % Fem.	Chena River Tower No. Fish	Chena River Tower % Fem.	Salcha River Tower No. Fish	Salcha River Tower % Fem.
2006	6,463	42.6			[d]	3,031	28.2	2,936	32.1	10,679	37.6
2007	4,504	44.7		740	24.9	1,427	39.0	3,806	26.0	6,425	31.0
2008	4,242	34.8		766	27.7	1,738	16.2	3,208	29.0	5,415 [e]	34.1
2009	3,004	46.0		1,637	49.0	1,955	29.3	5,253	40.0	12,774	33.9
2010	2,413	48.6		857	49.6	1,516	29.0	2,382	20.6	6,135	26.6
2011	5,213	20.2		1,796	33.9	2,692	19.5		22.7	7,200 [e]	36.3
2012	2,517	28.0		922	43.0	1,323	17.0	2,220 [g]	39.1	7,165	50.9
2013	1,998	40.4		772	44.8	1,126	34.1	1,859 [d]	40.3	5,465	50.5
2014	5,949	44.2			[d]	1,589	19.2	7,192 [h]	33.1		32.0
2015 [i]	6,705	39.7		2,391	40.7	1,319	29.5	6,291	39.0	6,879 [j]	37.0
SEG [k]	2,100–4,900										
BEG [l]								2,800–5,700		3,300–6,500	
Averages											
1986–2014	3,748	36.8	1,946	966	36.2	2,289	28.6	6,450	32.2	9,051	38.5
2005–2014	3,854	40.0	-	1,069	39.3	1,951	26.6	3,607	31.4	7,472	38.0
2010–2014	3,618	36.3	-	1,087	42.8	1,649	23.8	3,413	31.2	6,491	39.3
Minimum-14	1,148	14	756	244	21	1,126	16	1,859	12	0 3,294	24
Maximum-14	8,045	56	4,766	1,796	50	4,023	49	13,390	52	18,514	55

Note: Minimum and maximum indicate year with the lowest and highest values through 2014. Fem. = female.

[a] Past mark–recapture experiments utilizing electrofishing techniques for the first event have shown that carcass (second event) surveys tend to be biased with respect to sex and length. Therefore, an adjustment factor is applied.

[b] Tower counts.

[c] Mark–recapture population estimate.

[d] Project operations were hindered by high water most of the season.

[e] Estimate includes an expansion for missed counting days based on average run timing.

[f] Weir count.

[g] Estimated includes an expansion for missed counting days based on using 2 DIDSON sonars to assess Chinook salmon passage.

[h] Due to high water, DIDSON sonar was used and preliminary species apportionment was estimated using average run timing.

[i] Preliminary.

[j] Final estimate uses a binomial mixed-effects model to create passage estimates for the period of missed counts prior to start of tower operations on July 12.

[k] Sustainable Escapement Goal (SEG).

[l] Biological Escapement Goal (BEG).

Appendix B11.–Chinook salmon estimated U.S.-Canada border passage, total Canadian harvest, and spawning escapement in Canada, 1982–2015.

Year	Historic mark-recapture border passage estimate [a]	Eagle sonar estimate	U.S. harvest above Eagle sonar [b]	Canadian mainstem border passage estimate	Canadian mainstem harvest	Spawning escapement estimate [c]
1982	36,598			60,346 [d]	16,808	43,538
1983	47,741			63,227 [d]	18,752	44,475
1984	43,911			66,300 [d]	16,295	50,005
1985	29,881			59,586 [d]	19,151	40,435
1986	36,479			61,489 [d]	20,064	41,425
1987	30,823			58,870 [d]	17,563	41,307
1988	44,445			61,026 [d]	21,327	39,699
1989	42,620			77,718 [d]	17,419	60,299
1990	56,679			78,192 [d]	18,980	59,212
1991	41,187			63,172 [d]	20,444	42,728
1992	43,185			56,958 [d]	17,803	39,155
1993	45,027			52,713 [d]	16,469	36,244
1994	46,680			77,219 [d]	20,770	56,449
1995	52,353			70,761 [d]	20,088	50,673
1996	47,955			93,606 [d]	19,546	74,060
1997	53,400			69,538 [d]	15,717	53,821
1998	22,588			41,335 [d]	5,838	35,497
1999	23,716			49,538 [d]	12,354	37,184
2000	16,173			30,699 [d]	4,829	25,870
2001	52,207			62,333 [d]	9,774	52,559
2002	49,214			51,428 [e]	9,070	42,358
2003	56,929			90,037 [e]	9,446	80,591
2004	48,111			59,415 [e]	10,946	48,469
2005	42,245	81,528	2,566	78,962 [f]	10,977	67,985
2006	36,748	73,691	2,303	71,388 [f]	8,758	62,630
2007	22,120	41,697	1,999	39,698 [f]	4,794	34,904
2008	14,666	38,097	815	37,282 [f]	3,399	33,883

-continued-

Year	Historic mark-recapture border passage estimate [a]	Eagle sonar estimate	U.S. harvest above Eagle sonar	Canadian mainstem border passage estimate		Canadian mainstem harvest	Spawning escapement estimate [b]
2009	-	69,957	382	69,575	[f]	4,297	65,278
2010	-	35,074	604	34,470	[f]	2,456	32,014
2011	-	51,271	370	50,901	[f]	4,594	46,307
2012	-	34,747	91	34,656	[f]	2,000	32,656
2013	-	30,725	152	30,573	[f]	1,904	28,669
2014	-	63,482	51	63,431	[f]	100	63,331
2015	-	84,015	341	83,674	[f]	1,000	82,674
Averages							
1982–2014	40,136			59,589		12,204	47,385
2005–2014	NA			51,094		4,328	46,766
2010–2014	NA			42,806		2,211	40,595
Minimum-14	14,666			30,573		100	25,870
Maximum-14	56,929			93,606		21,327	80,591

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] From 1982 to 2008, a mark–recapture program was used to determine border passage; fish were sampled and tagged near the border using fish wheels and sampled for marks/tags in upstream fisheries. The Eagle sonar project replaced the mark–recapture program in 2005.

[b] U.S. harvests between the sonar site and border prior to 2008 is unknown because subsistence harvest in the Eagle area extended above and below the sonar site, but were most likely in the hundreds for Chinook salmon. Starting in 2008, subsistence harvests between the sonar site and the U.S./Canada border were recorded specifically for purpose of estimating border passage.

[c] Canadian spawning escapement estimated as border passage minus Canadian harvest.

[d] Chinook salmon passage for Yukon mainstem at U.S./Canada border from 1982 to 2001 was reconstructed using a linear relationship with 3-area index (aerial surveys of Little Salmon, Big Salmon, and Nisutlin rivers in 2002–2007) plus Canadian harvests.

[e] Border passage estimated in 2002–2004 using escapement estimate from a radio tagging proportion study, plus Canadian harvest.

[f] Since 2005, border passage was estimated as fish counted by the mainstem Yukon River sonar operated near Eagle minus the U.S. harvest upriver from the sonar project.

Appendix B12.–Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2015.

Year	Tatchun Creek [a]	Blind Creek Weir	Chandindu River Weir	Big Salmon Sonar	Klondike River Sonar	Teslin River Sonar	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution
1961							1,068	0
1962							1,500	0
1963							483	0
1964							595	0
1965							903	0
1966	7 [b]						563	0
1967							533	0
1968							414	0
1969							334	0
1970	100						625	0
1971	130						856	0
1972	80						391	0
1973	99						224	0
1974	192						273	0
1975	175						313	0
1976	52						121	0
1977	150						277	0
1978	200						725	0
1979	150						1,184	0
1980	222						1,383	0
1981	133						1,555	0
1982	73						473	0
1983	264						905	0
1984	153						1,042	0
1985	190						508	0
1986	155						557	0
1987	159						327	0
1988	152						405	16
1989	100						549	19
1990	643						1,407	24
1991							1,266 [c]	51 [c]
1992	106						758 [c]	84 [c]
1993	183						668 [c]	73 [c]
1994	477						1,577 [c]	54 [c]
1995	397						2,103	57
1996	423						2,958	35
1997	1,198	957					2,084	24
1998	405	373	132				777	95
1999	252	892	239				1,118	74
2000	276 [d]		4 [e]				677	69
2001			129 [f]				988	36

-continued-

Year	Tatchun Creek [a]	Blind Creek Weir	Chandindu River Weir	Big Salmon Sonar	Klondike River Sonar	Teslin River Sonar	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution
2002			[g]				605	39
2003		1,115	185 [h]				1,443	70
2004		792					1,989	76
2005		525		5,584			2,632	57
2006		677		7,308			1,720	47
2007		304		4,504			427	56
2008		276		1,329			399	54
2009		716		9,261	5,147		828	47
2010		270		3,817	803		672	49
2011		360		5,156	1,181		1,534	48
2012		157		2,584		3,396	1,030	59
2013[i]		312		3,242		9,916	1,139	67
2014[i]		602		6,321		17,507	1,601	78
2015[i]		964		10,071		20,410	1,465	60
Averages								
1961–2014	235	555	138	4,911	-	-	953	27
2005–2014	-	420	-	4,911	2,377	10,273	1,198	56
2010–2014	-	340	-	4,224	992	10,273	1,195	60
Minimum-14	7	157	4	1,329	803	3,396	121	0
Maximum-14	1,198	1,115	239	9,261	5,147	17,507	2,958	95

Note: Canadian mainstem border passage and spawning escapement estimates are based on a 3-Area escapement index, radiotelemetry (local) (2002–2004), and the mainstem Yukon River sonar operated near Eagle (2005–2007). Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] All foot surveys prior to 1997 except 1978 (boat survey) and 1986 (aerial survey) and weir counts from 1997 to 2000.

[b] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[c] Counts and estimated percentages may be slightly exaggerated. In some or all of these years a number of adipose-clipped fish ascended the Fishway, and were counted more than once. These fish would have been released into the Fishway as fry between 1989 and 1994, inclusive.

[d] Flood conditions caused early termination of this program.

[e] High water delayed project installation, therefore, counts are incomplete.

[f] Weir was breached from July 31 to August 7 due to high water.

[g] Resistance Board weir (RBW) tested for 3 weeks.

[h] Combination RBW and conduit weir tested and operational from July 10-30.

[i] Data are preliminary.

Appendix B13.–Summer chum salmon escapement counts for selected spawning areas in the Alaska portion of the Yukon River drainage, 1973–2015.

	Andreafsky River			Anvik River		Rodo River	Kaltag River	Nulato River		
	East Fork		West Fork					South Fork	North Fork [a]	Mainstem
Year	Aerial [b]	Sonar, Tower, or Weir [c] Counts	Aerial [b]	Aerial [d]	Tower and Sonar	Aerial [b]	Tower	Aerial [b]	Aerial [b]	Tower
1973	10,149 [e]		51,835	249,015						
1974	3,215 [e]		33,578	411,133		16,137		29,016	29,334	
1975	223,485		235,954	900,967		25,335		51,215	87,280	
1976	105,347		118,420	511,475		38,258		9,230 [e]	30,771	
1977	112,722		63,120	358,771		16,118		11,385	58,275	
1978	127,050		57,321	307,270		17,845		12,821	41,659	
1979	66,471		43,391	-	277,712	-		1,506	35,598	
1980	36,823 [e]		114,759	-	482,121	-		3,702 [e]	11,244 [e]	
1981	81,555	147,312 [f]	-	-	1,479,582	-		14,348	-	
1982	7,501 [e]	180,078 [f]	7,267 [e]	-	444,581	-		-	-	
1983	-	110,608 [f]	-	-	362,912	-		1,263 [e]	19,749	
1984	95,200 [e]	70,125 [f]	238,565	-	891,028	-		-	-	
1985	66,146	-	52,750	-	1,080,243	24,576		10,494	19,344	
1986	83,931	167,614 [f]	99,373	-	1,085,750	-		16,848	47,417	
1987	6,687 [e]	45,221 [f]	35,535	-	455,876	-		4,094	7,163	
1988	43,056	68,937 [f]	45,432	-	1,125,449	13,872		15,132	26,951	
1989	21,460 [e]	-	-	-	636,906	-		-	-	
1990	11,519 [e]	-	20,426 [e]	-	403,627	1,941 [e]		3,196 [e,g]	1,419 [e]	
1991	31,886	-	46,657	-	847,772	3,977		13,150	12,491	
1992	11,308 [e]	-	37,808 [e]	-	775,626	4,465		5,322	12,358	
1993	10,935 [e]	-	9,111 [e]	-	517,409	7,867		5,486	7,698	
1994	-	200,981 [i]	-	-	1,124,689	-	47,295	-	-	148,762 [i]
1995	-	172,148	-	-	1,339,418	12,849	77,193	10,875	29,949	236,890
1996	-	108,450	-	-	933,240	4,380	51,269	8,490 [e,h]	-	129,694

-continued-

Appendix B13.–Page 2 of 5.

Year	Andreafsky River			Anvik River		Rodo River	Kaltag River	Nulato River		
	East Fork		West Fork					South Fork	North Fork [a]	Mainstem
	Aerial [b]	Sonar, Tower, or Weir Counts	Aerial [b]	Tower and Aerial [d]	Sonar	Aerial [b]	Tower	Aerial [b]	Aerial [b]	Tower
1997	-	51,139	-	-	605,752	2,775 [e]	48,018	-	-	157,975
1998	-	67,720	-	-	487,301	-	8,113	-	-	49,140
1999	-	32,587	-	-	437,356	-	5,339	-	-	30,076
2000	2,094 [e]	24,785	18,989 [e]	-	196,349	-	6,727	-	-	24,308
2001	-	2,134 [g]	-	-	224,058	-	-	-	-	-
2002	-	44,194	-	-	459,058	-	13,583	-	-	72,232
2003	-	22,461	-	-	256,920	-	3,056	-	-	19,590 [g]
2004	-	64,883	-	-	365,353	-	5,247	-	-	-
2005	-	20,127	-	-	525,391	-	22,093	-	-	-
2006	3,100 [e]	102,260	617	-	605,485	-	-	7,772	11,658	-
2007	-	69,642	-	-	460,121	-	-	21,825	15,277	-
2008	9,300	57,259	25,850	-	374,928	-	-	12,070	10,715	-
2009	736	8,770	3,877	-	193,099	621	-	2,120	567	-
2010	1,982	72,893	24,380	-	396,173	-	-	1,891	1,038	-
2011	12,889	100,473	10,020	-	642,527	6,011	-	9,454	8,493	-
2012	-	56,680	-	-	484,091	15,606	-	20,600	14,948	-
2013	10,965	61,234	9,685	-	577,877	-	-	13,695	13,230	-
2014	-	37,793	-	-	399,796	-	-	-	-	-
2015	6,004	50,338	2,836	36,871	374,968	3,685	-	4,102	9,525	-
GOAL [j]		>40,000			350,000-700,000					
Average										
1973–2014	44,352	77,447	56,189	456,439	609,877	12,508	26,176	11,741	22,185	-
2005–2014	6,495	58,713	12,405	-	465,949	7,413	22,093	11,178	9,491	-
2010–2014	8,612	65,815	14,695	-	500,093	10,809	-	11,410	9,427	-
Minimum–14	736	2,134	617	249,015	193,099	621	3,056	1,263	567	19,590
Maximum–14	223,485	200,981	238,565	900,967	1,479,582	38,258	77,193	51,215	87,280	236,890

-continued-

Appendix B13.–Page 3 of 5.

	Henshaw Creek	Gisasa River		Hogatza River		Tozitna River	Chena River		Salcha River	
				Clear & Caribou Cr.	Clear Creek					
Year	Weir	Aerial [b]	Weir	Aerial [b]	Tower	Weir and Aerial [b]	Aerial [b]	Tower	Aerial [b]	Tower
1973							79 [e]		290	
1974		22,022				1,823	4,349		3,510	
1975		56,904		22,355		3,512	1,670		7,573	
1976		21,342		20,744		725 [e]	685		6,484	
1977		2,204 [e]		10,734		761 [e]	610		677 [e]	
1978		9,280 [e]		5,102		2,262	1,609		5,405	
1979		10,962		14,221		-	1,025 [e]		3,060	
1980		10,388		19,786		580	338		4,140	
1981		-		-		-	3,500		8,500	
1982		334 [e]		4,984 [e]		874	1,509		3,756	
1983		2,356 [e]		28,141		1,604	1,097		716 [e]	
1984		-		184 [e]		-	1,861		9,810	
1985		13,232		22,566		1,030	1,005		3,178	
1986		12,114		-		1,778	1,509		8,028	
1987		2,123		5,669 [e]		-	333		3,657	
1988		9,284		6,890		2,983	432		2,889 [e]	
1989		-		-		-	714 [e]		1,574 [e]	
1990		450 [e]		2,177 [e]		36	245 [e]		450 [e]	
1991		7,003		9,947		93	115 [e]		154 [e]	
1992		9,300		2,986		794	848 [e]		3,222	
1993		1,581		-		970	168	5,400	212	5,809
1994		6,827	51,116 [i]	8,247 [i]		-	1,137	9,984	4,916	39,450
1995		6,458	136,886	-	116,735	4,985	185 [e]	3,519 [g]	934 [e]	30,784
1996		-	158,752	27,090 [i]	100,912	2,310	2,061	12,810 [g]	9,722	74,827
1997		686 [e]	31,800	1,821 [e]	76,454	428 [e]	594 [e]	9,439 [g]	3,968 [e]	35,948
1998		-	21,142	120 [e]	212 [g]	7 [e]	24 [e]	5,901	370 [e]	17,289
1999		-	10,155	-	11,283	-	520	9,165	150	23,221
2000	27,271	-	11,410	-	19,376	480	105	3,515	228	20,516
2001	35,031	-	17,936	-	3,674	12,527	2	4,773	-	14,900

-continued-

Appendix B13.–Page 4 of 5.

Year	Henshaw Creek	Gisasa River		Hogatza River			Tozitna River	Chena River		Salcha River	
				Clear & Caribou Cr.	Clear Creek		Weir and				
	Weir	Aerial [b]	Weir	Aerial [b]	Tower		Aerial [b]	Aerial [b]	Tower	Aerial [b]	Tower
2002	25,249	-	33,481	-	13,150		18,789	-	1,021 [g]	78	20,837 [j]
2003	22,556	-	25,999	-	6,159		8,487	-	573 [g]	-	-
2004	86,474	-	37,851	-	15,661		25,003	-	15,162 [g]	-	47,861
2005	237,481	-	172,259	-	26,420		39,700	219	2,928 [g]	4,320	193,085
2006	-	1,000	261,306	-	29,166 [j]		22,629	469	35,109 [g]	152	111,869
2007	44,425	-	46,257	-	6,029 [j]		8,470	-	4,999	4 [e]	13,069
2008	97,281	20,470	36,938	-	-		9,133	37	1,300 [g]	0 [e]	2,212 [g]
2009	156,201	1,060	25,904	3,981	-		8,434	-	16,516	-	31,035
2010	105,398	1,096	47,669	840	-		-	-	7,560	-	22,185
2011	248,247	13,228	95,796	3,665	-		11,351	-	-	-	66,564 [k]
2012	292,082	- [e]	83,423	23,022	-		11,045	-	6,882	-	46,251
2013	285,008	9,300 [e]	80,055	-	-		-	-	21,372	-	60,981
2014	- [e]	-	32,523	-	-		-	-	17,076 [e]	-	- [e]
2015	238,529	5,601	42,747	6,080	-		-	-	8,620	0 [e]	12,812
GOAL											
Average											
1973–2014	127,957	9,654	67,556	10,664	32,710		6,568	908	9,286	3,095	43,935
2005–2014	183,357	7,692	88,213	7,877	20,538		15,823	242	12,638	1,119	60,806
2010–2014	232,684	7,875	67,893	9,176	-		11,198	-	13,223	-	48,995
Minimum–14	22,556	334	10,155	120	212		7	2	573	0	2,212
Maximum–14	292,082	56,904	261,306	28,141	116,735		39,700	4,349	35,109	9,810	193,085

-continued-

Note: Unless otherwise noted blank cells indicate years prior to the project being operational. Dashes indicate years in which no information was collected. Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.

[b] Aerial survey counts are peak counts only, survey rating is fair or good unless otherwise noted.

[c] East Fork Andreafsky passage estimated with: sonar 1981–1984, tower counts 1986–1988; weir counts from 1994 to present. The project did not operate in 1985 and 1989–1993.

[d] From 1972 to 1979 counting tower operated; escapement estimate listed is the tower counts plus expanded aerial survey counts below the tower.

[e] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.

[f] Mainstem counts below the confluence of the North and South Forks of the Nulato River included in the South Fork counts.

[g] Incomplete count due to late installation and/or early removal of project or high water events.

[h] Biological (Andreafsky) or Sustainable (Anvik) Escapement Goal

[i] Bureau of Land management helicopter survey.

[j] Project operated as a video monitoring system.

[k] Estimate includes an expansion for missed counting days based on average run timing. Minimum documented abundance from successful counting days was 30,411 (SE not reported).

Appendix B14.–Fall chum salmon abundance estimates or escapement estimates for selected spawning areas in Alaska portions of the Yukon River drainage, 1971–2015.

	Yukon River	Tanana River Drainage					Upper Yukon River Drainage		
Year	Mainstem Sonar Estimate	Toklat River [a]	Kantishna River Abundance Estimate [b]	Delta River [c]	Bluff Cabin Slough [d]	Upper Tanana River Abundance Estimate [e]	Rampart-Rapids Mark-Recapture Estimate	Chandalar River [f]	Sheenjek River [g]
1971									
1972				5,384 [h]					
1973				10,469 [h]					
1974		41,798		5,915 [h]					89,966 [i]
1975		92,265		3,734					173,371 [i]
1976		52,891		6,312					26,354 [i]
1977		34,887		16,876					45,544 [i]
1978		37,001		11,136 [h]					32,449 [i]
1979		158,336		8,355 [h]					91,372 [i]
1980		26,346 [j]		5,137 [h]	3,190 [k]				28,933 [i]
1981		15,623		23,508 [h]	6,120 [k]				74,560 [l]
1982		3,624		4,235 [h]	1,156				31,421 [l]
1983		21,869		7,705 [h]	12,715				49,392 [l]
1984		16,758		12,411 [h]	4,017				27,130 [l]
1985		22,750		17,276	2,655 [k]				152,768 [l,m]
1986		17,976		6,703	3,458			59,313	84,207 [m,n]
1987		22,117		21,180 [h]	9,395			52,416	153,267 [m,n]
1988		13,436		18,024 [h]	4,481 [k]			33,619	45,206 [n]
1989		30,421		21,342	5,386 [k]			69,161	99,116 [n]
1990		34,739		8,992	1,632			78,631	77,750 [n]
1991		13,347		32,905	7,198				86,496 [o]
1992		14,070		8,893	3,615 [k]				78,808
1993		27,838		19,857 [h]	5,550 [k]				42,922
1994		76,057		23,777	2,277 [k]				150,565
1995	1,053,248	54,513 [j]		20,587 [h]	19,460	268,173	230,643	280,999	241,855

-continued-

Appendix B14.–Page 2 of 4.

Year	Yukon River Mainstem Sonar Estimate	Tanana River Drainage					Upper Yukon River Drainage		
		Toklat River [a]	Kantishna River Abundance Estimate [b]	Delta River [c]	Bluff Cabin Slough [d]	Upper Tanana River Abundance Estimate [e]	Rampart-Rapids Mark-Recapture Estimate	Chandalar River [f]	Sheenjek River [g]
1996	[p]	18,264		19,758	7,074 [c]	134,563	654,296	230,450	246,889
1997	506,621	14,511		7,705	5,707 [c]	71,661	369,547	211,914	80,423 [q]
1998	372,927	15,605		7,804	3,549 [c]	62,014	194,963	83,899	33,058
1999	379,493	4,551	27,199	16,534	7,559 [c]	97,843	189,741	92,685	14,229
2000	247,935	8,911	21,450	3,001	1,595	34,844	[p]	71,048	30,084 [r]
2001	376,182	6,007 [g]	22,992	8,103	1,808 [k]	96,556 [t]	201,766	112,664	53,932
2002	326,858	28,519	56,665	11,992	3,116	109,961	196,186	94,472	31,642
2003	889,778	21,492	87,359	22,582	10,600 [k]	193,418	485,102	221,343	44,047 [u]
2004	594,060	35,480	76,163	25,073	10,270 [k]	123,879	618,597 [v]	169,848	37,878
2005	1,813,589	17,779 [j]	107,719	28,132	11,964 [k]	337,755	1,987,982	526,838	561,863 [m]
2006	790,563		71,135	14,055		202,669		254,778	160,178 [m]
2007	684,011		81,843	18,610		320,811		243,805	65,435 [m]
2008	615,127			23,055	1,198 [k]			178,278	50,353 [m]
2009	[p]			13,492	2,900 [k]			[q]	54,126 [m]
2010	393,326			17,993	1,610 [k]			167,532	22,053
2011	764,194			23,639	2,655 [k]			298,223	97,976 [m]
2012	682,510			9,377 [d]				205,791	104,701 [m]
2013	716,727			31,955	5,554 [k]			252,710	
2014	650,808			32,481 [d]	4,095 [k]			226,489	
2015	546,894 [w]			33,401 [d]	6,020 [k]			164,486 [w]	
Escapement [x]	300,000 [y]	15,000 [z]		6,000		46,000 [a]	212,000 [ab]	74,000	50,000 [a, c]
Objective	600,000	33,000		13,000		103,000	441,000	152,000	104,000
Averages									
1971–2014	658,775	31,243	61,392	15,257	5,424	158,011	512,882	175,704	97,856
2005–2014	790,095	17,779	86,899	21,279	4,282	287,078	1,987,982	261,605	139,586
2010–2014	641,513	-	-	23,089	3,479	-	-	230,149	74,910

-continued-

Year	Yukon River Mainstem Sonar Estimate	Tanana River Drainage: Toklat River [a]	Tanana River Drainage: Kantishna River Abundance Estimate [b]	Tanana River Drainage: Delta River [c]	Tanana River Drainage: Bluff Cabin Slough [d]	Tanana River Drainage: Upper Tanana River Abundance Estimate [e]	Upper Yukon River Drainage: Rampart-Rapids Mark-Recapture Estimate	Upper Yukon River Drainage: Chandalar River [f]	Upper Yukon River Drainage: Sheenjek River [g]
Minimum-14	247,935	4,551	21,450	3,001	1,198	34,844	189,741	71,048	14,229
Maximum-14	1,813,589	158,336	107,719	32,480	19,460	337,755	1,987,982	526,838	561,863

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987–1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse.

[b] Fall chum salmon abundance estimate for the Kantishna and Toklat River drainages is based on a mark–recapture program. Number of tagging and recovery wheels changed over the years.

[c] Population estimates generated from replicate foot surveys (area under the curve method), unless otherwise indicated.

[d] Peak foot survey, unless otherwise indicated.

[e] Fall chum salmon abundance estimate for the upper Tanana River drainage is based on a mark–recapture program. Upper Tanana River consists of that portion upstream of the confluence with the Kantishna River. Number of tagging and recovery wheels changed over the years.

[f] Single-beam sonar estimate for 1986 to 1990 (not used in run reconstruction), split-beam sonar estimate 1995 to 2006, DIDSON in since 2007, project was aborted in 2009. Sonar counts on the Chandalar River are extrapolated after conclusion of the project through October 9 from 1995 to present.

[g] Single-beam sonar estimate beginning in 1981, split-beam sonar estimate 2003 to 2004, and DIDSON 2005 to 2012. Sonar counts on the Sheenjek River are extrapolated after conclusion of the project through October 9 from 2005 to 2012.

[h] Estimates are a total spawner abundance, using migratory time density curves and stream life data.

[i] Total escapement estimate using sonar to aerial survey expansion factor of 2.22.

[j] Minimal estimate because of late timing of ground surveys with respect to peak of spawning.

[k] Aerial survey count, unless otherwise indicated.

[l] Project started late, estimated escapements expanded for portion missed using average run timing curves based on Chandalar (1986–1990) and Sheenjek (1991–1993) rivers.

[m] Sonar counts include both bank operations in 1985–1987, 2005–2009, and 2011–2012.

[n] Expanded estimates for period approximating second week of August through fourth week of September, using annual Chandalar River run timing data (1986–1990).

[o] Total abundance estimates are for the period approximating second week of August through fourth week of September (1991 to present). Comparative escapement estimates before 1986 are considered more conservative; approximating the period end of August through September.

[p] Project operated all or partial season, estimate was not useable.

[q] Data interpolated due to high water from August 29 to September 3, 1997; during buildup to peak passage on the Sheenjek River.

-continued-

[r] Sheenjek sonar project ended early (September 12) because of low water therefore estimate was expanded based on average run timing (62%).

[s] Minimal estimate because Sushana River was breached by the main channel and uncountable.

[t] Low numbers of tags deployed and recovered resulted in an estimate with an extremely large confidence interval (95% CI +/- 41,072).

[u] Sheenjek sonar project ended on peak daily passages due to late run timing, estimate was expanded based on run timing (87%) at Rampart.

[v] Mark–recapture estimate for 2004 was 618,579 fall chum salmon (SE 60,714 notably high).

[w] Data are preliminary.

[x] Escapement Goal (EG) includes individual tributary BEGs (biological) and drainagewide SEG (sustainable).

[y] Drainagewide escapement goal is related to mainstem passage estimate based on the sonar near Pilot Station minus upriver harvests.

[z] EG discontinued in 2010.

[aa] The BEG for the Tanana River as a whole is 61,000 to 136,000. However it includes the Toklat River plus the Upper Tanana River which was broke out here for comparison to the upper Tanana River abundance estimates.

[ab] Includes that portion of the Yukon River upstream of Rampart Rapids therefore the sum of BEG's for Chandalar, Sheenjek, Fishing Branch rivers and Mainstem Yukon River in Canada escapements based on Eggers (2001) and is not an established BEG.

[ac] The BEG is based on estimates of Sheenjek escapements from 1974 to 1999 (Eggers 2001) which were primarily right bank only estimates.

Appendix B15.–Fall chum salmon escapement estimates for selected spawning areas in Canadian portions of the Yukon River drainage, 1971–2015.

	Porcupine Drainage		Mainstem							
Year	Fishing Branch River	[a]	Porcupine River Sonar	Yukon River Index	[b,c]	Koidern River	[b]	Kluane River	[b, d]	Teslin River	[b, e]
1971	312,800	[f]									
1972	35,230	[g]						198	[g,h]		
1973	15,991			383				2,500			
1974	31,841							400			
1975	353,282			7,671				362	[h]		
1976	36,584	[f]						20			
1977	88,400	[f]						3,555			
1978	40,800	[f]						0	[h]		
1979	119,898	[f]						4,640	[h]		
1980	55,268	[f]						3,150			
1981	57,386	[i]						25,806			
1982	15,901	[f]		1,020	[j]			5,378			
1983	27,200	[f]		7,560				8,578	[h]		
1984	15,150	[f]		2,800	[k]	1,300		7,200		200	
1985	56,223			10,760		1,195		7,538		356	
1986	31,811			825		14		16,686		213	
1987	49,038			6,115		50		12,000			
1988	23,645			1,550		0		6,950		140	
1989	44,042			5,320		40		3,050		210	[l]
1990	35,000	[m]		3,651		1		4,683		739	
1991	37,870			2,426		53		11,675		468	
1992	22,539			4,438		4		3,339		450	
1993	28,707			2,620		0		4,610		555	
1994	65,247			1,429	[j]	20	[j]	10,734		209	[l]
1995	51,971	[n]		4,701		0		16,456		633	
1996	77,302			4,977				14,431		315	
1997	27,031			2,189				3,350		207	
1998	13,687			7,292				7,337		235	
1999	12,958							5,136		19	[i]
2000	5,057			933	[l]			1,442		204	
2001	21,737			2,453				4,884		5	
2002	13,636			973				7,147		64	
2003	29,713			7,982				39,347		390	
2004	20,417			3,440				18,982		167	
2005	119,058			16,425				34,600		585	
2006	30,954			6,553				18,208		620	
2007	32,150										
2008	19,086	[n]									
2009	25,828	[o]									
2010	15,413	[o]									
2011	13,085	[n,o]									

-continued-

Appendix B15.–Page 2 of 2.

Year	Porcupine Drainage: Fishing Branch River [a]	Porcupine Drainage: Porcupine River Sonar	Mainstem: Yukon River Index [b,c]	Koidern River [b]	Kluane River [b, d]	Teslin River [b, e]
2012	22,399 [o]					
2013[p]	25,376 [q]	35,615				
2014[p]	7,304 [q]	17,756				
2015[p]	8,351 [r]	21,397				
Goals [s]	50,000-120,000					
IMEG [t]	22,000-49,000					
Averages						
1971-2014	49,637	26,686	4,480	223	8,982	317
2005-2014	31,065	26,686	11,489	-	26,404	603
2010-2014	16,715	26,686	-	-	-	-
Minimum-14	5,057	17,756	383	0	0	5
Maximum-14	353,282	35,615	16,425	1,300	39,347	739

Note: Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Weir count, unless otherwise indicated. Weir counts from 1972–1975, 1985–1989, 1991–1992, 1996–2012 were expanded to represent the remainder of the run after the project was terminated for the season through October 25.

[b] Aerial survey, unless otherwise indicated.

[c] Index area includes Tatchun Creek to Fort Selkirk.

[d] Index area includes Duke River to end of spawning sloughs below Swede Johnston Creek.

[e] Index area includes Boswell Creek area (5 km below to 5 km above confluence).

[f] Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.

[g] Weir installed September 22. Estimate consists of weir count of 17,190 after September 22, and tagging passage estimate of 17,935 before weir installation.

[h] Foot survey, unless otherwise indicated.

[I] Initial aerial survey count doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

[j] Boat survey.

[k] Total index not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.

[l] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[m] Weir not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000-40,000 fish considering aerial survey timing.

[n] Incomplete count caused by late installation and/or early removal of project or high water events.

[o] Run timing was late and counts were expanded to represent the remainder of the run after the project was terminated for the season.

[p] Data are preliminary.

[q] Fishing Branch River weir did not operate and escapement was estimated from a sonar operated on the upper Porcupine River minus Old Crow harvest and the proportion of radio tags to Fishing Branch River.

[r] Escapement Objective (EO) based on U.S./Canada Treaty Obligations, some years stabilization or rebuilding goals are applied.

[s] Interim Management Escapement Goal (IMEG) established for 2008-2012 based on percentile method.

[t] Interim Management Escapement Goal (IMEG) established for 2010-2012 based on brood table of Canadian origin mainstem stocks (1982 to 2003).

Appendix B16.–Fall chum salmon passage, expansion, border passage, and escapement estimates based on the mainstem Yukon River projects near the U.S. and Canada border, 1980–2015.

Date	Sonar Estimate	Expanded Estimate [a]	Eagle Area Subsistence Harvest	Mainstem Border Passage Estimate [b]	Canadian Mainstem Harvest	Mainstem Escapement Estimate [c]
1980				39,130	16,218	22,912
1981				66,347	19,281	47,066 [d]
1982				47,049	15,091	31,958
1983				118,365	27,490	90,875
1984				81,900	25,267	56,633 [d]
1985				99,775	37,765	62,010
1986				101,826	13,886	87,940
1987				125,121	44,345	80,776
1988				69,280	32,494	36,786
1989				55,861	20,111	35,750
1990				82,947	31,212	51,735
1991				112,303	33,842	78,461
1992				67,962	18,880	49,082
1993				42,165	12,422	29,743
1994				133,712	35,354	98,358
1995				198,203	40,111	158,092
1996				143,758	21,329	122,429
1997				94,725	9,306	85,419
1998				48,047	1,795	46,252
1999				72,188 [e]	13,636	58,552
2000				57,978 [e]	4,246	53,732
2001				38,769 [e]	5,278	33,491
2002				104,853 [e]	6,232	98,621
2003				153,656 [e]	10,523	143,133
2004				163,625 [e]	9,545	154,080
2005				451,477	13,979	437,498
2006	236,386	245,290	17,775	227,515 [f, g]	6,617	220,898
2007	235,871	265,008	18,691	246,317 [f, g]	9,330	236,987
2008	171,347	185,409	11,381	174,028 [f, g]	6,130	167,898

-continued-

Date	Sonar Estimate	Expanded Estimate [a]	Eagle Area Subsistence Harvest	Mainstem Border Passage Estimate [b]	Canadian Mainstem Harvest	Mainstem Escapement Estimate [c]
2009	95,462	101,734	6,995	94,739 [g]	1,113	93,626
2010	125,547	132,930	11,432	121,498 [g]	3,709	117,789
2011	212,162	224,355	12,477	211,878 [g]	6,312	205,566
2012	147,710	153,248	11,681	141,567 [g]	3,905	137,662
2013	200,754	216,791	12,642	204,149 [g]	3,887	200,262
2014	167,715	172,887	13,041	159,846 [g]	3,050	156,796
2015 [h]	112,136	125,095	12,540	112,555 [g]	3,897	108,658
Averages						
1980–2014				124,359	16,105	108,253
2006–2014	176,995	188,628	12,902	175,726	4,895	170,832

Note: Estimates for subsistence caught salmon between the sonar site and border (Eagle area) prior to 2008 include an unknown portion caught below the sonar site. This number is most likely in the thousands for chum salmon. Starting in 2008, the estimates for subsistence caught salmon only include salmon harvested between the sonar site and the U.S./Canada border.

[a] Sonar estimates include an expansion for fish that may have passed after operations ceased through October 18.

[b] Border Passage Estimate is based off of a mark–recapture estimate unless otherwise indicated.

[c] Excludes Fishing Branch River escapement (estimated border passage minus Canadian mainstem harvest).

[d] Escapement estimate based on mark–recapture program unavailable. Estimate based on assumed average exploitation rate.

[e] 1999 to 2004 border passage estimates were revised using a Stratified Population Analysis System (Arnason et. al 1995).

[f] 2006 to present border passage estimate is based on sonar minus harvest from Eagle residents upstream of deployment.

[g] Mark–recapture border passage estimates include 217,810, 235,956, and 132,048 from 2006 to 2008 respectively, during transition to sonar.

[h] Data are preliminary.

Appendix B17.–Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaska portion of the Yukon River drainage, 1972–2015.

		Nenana River Drainage				Upper Tanana River Drainage		
Year	Yukon River Mainstem Sonar Estimate [a]	Lost Slough	Nenana Mainstem [b]	Wood Creek	Seventeen Mile Slough	Delta Clearwater River [c]	Clearwater Lake and Outlet	Richardson Clearwater River
1972						632 (b)	417 (f)	454 (f) [d]
1973						3,322 (u)	551 (u)	375 (u)
1974		1,388 (f)			27 (f)	3,954 (h) [d]	560 (f)	652 (h)
1975		827 (f)			956 (f)	5,100 (b)	1,575 (b)	
1976		118 (f)			281 (f)	1,920 (b)	1,500 (b)	80 (f) [d]
1977		524 (f) [d]		310 (g)	1,167 (f)	4,793 (b)	730 (b)	327 (f)
1978		350 (f)		300 (g)	466 (f)	4,798 (b)	570 (b)	
1979		227 (f)			1,987 (f)	8,970 (b)	1,015 (b)	372 (f)
1980		499 (f) [d]		1,603 (g)	592 (f)	3,946 (b)	1,545 (b)	611 (f)
1981		274 (f)		849 (w) [e]	1,005 (f)	8,563 (u) [f]	459 (f)	550 (f)
1982				1,436 (w) [e]	(f)	8,365 (g) [f]		
1983		766 (f)		1,042 (w)	103 (f)	8,019 (b) [f]	253 (f)	88 (f)
1984		2,677 (f)		8,826 (w)	(f)	11,061 (b)	1,368 (f)	428 (f)
1985		1,584 (f)		4,470 (w)	2,081 (f)	5,358 (b)	750 (f)	
1986		794 (f)		1,664 (w)	218 (b)	10,857 (b)	3,577 (f)	146 (f) [d]
1987		2,511 (f)		2,387 (w)	3,802 (f)	22,300 (b)	4,225 (b)	
1988		348 (f)		2,046 (w)		21,600 (b)	825 (b)	
1989				412 (w)	824 (f) [d]	11,000 (b)	1,600 (b)	483 (f)
1990		688 (f)	1,308 (f)		(h) [d]	8,325 (b)	2,375 (b)	
1991		564 (f)	447 (f)		52 (f)	23,900 (b)	3,150 (b)	
1992		372 (f)			490 (f)	3,963 (b)	229 (b)	500 (f)

-continued-

Year	Yukon River Mainstem Sonar Estimate [a]	Nenana River Drainage				Upper Tanana River Drainage		
		Lost Slough	Nenana Mainstem [b]	Wood Creek	Seventeen Mile Slough	Delta Clearwater River [c]	Clearwater Lake and Outlet	Richardson Clearwater River
1993		350 (f)	419 (f)	666 (w) [g]	581 (h)	10,875 (b)	3,525 (b)	
1994		944 (h)	1,648 (h)	1,317 (w) [h]	2,909 (h)	62,675 (b)	3,425 (b)	5,800 (f)
1995	100,664	4,169 (f)	2,218 (h)	500 (w)	1,512 (h)	20,100 (b)	3,625 (b)	
1996		2,040 (h)	2,171 (h)	201 (u) [d]	3,668 (g/b)	14,075 (b)	1,125 (b) [d]	
1997	105,956	1,524 (h)	1,446 (h)	[i]	1,996 (h)	11,525 (b)	2,775 (b)	
1998	129,076	1,360 (h) [d]	2,771 (h) [d]	[i]	1,413 (g/b)	11,100 (b)	2,775 (b)	
1999	60,886	1,002 (h) [d]	745 (h) [d]	370 (h)	662 (h) [d]	10,975 (b)		
2000	169,392	55 (h) [d]	68 (h) [d]	[i]	879 (h) [d]	9,225 (b)	1,025 (b)	2,175 (h)
2001	132,283	242 (h)	859 (h)	699 (h)	3,753 (h)	27,500 (b)	4,425 (b)	1,531 (f)
2002	117,908	0 (h)	328 (h)	935 (h)	1,910 (h)	38,625 (b)	5,900 (b)	874 (f)
2003	265,119	85 (h)	658 (h)	3,055 (h)	4,535 (h)	102,800 (b)	8,800 (b)	6,232 (h)
2004	199,884	220 (h)	450 (h)	840 (h)	3,370 (h)	37,550 (b)	2,925 (b)	8,626 (h)
2005	184,071	430 (h)	325 (h)	1,030 (h)	3,890 (h)	34,293 (b)	2,100 (b)	2,024 (h)
2006	131,919	194 (h)	160 (h)	634 (h)	1,916 (h)	16,748 (b)	4,375 (b)	271 (h)
2007	173,289	63 (h)	520 (h)	605 (h)	1,733 (h)	14,650 (b)	2,075 (b)	553 (h)
2008	135,570	1,342 (h)	1,539 (h)	578 (h)	1,652 (h)	7,500 (b)	1,275 (b)	265 (h)
2009	206,620 [j]	410 (h)		470 (h)	680 (h)	16,850 (b)	5,450 (b)	155 (h)
2010	155,784	1,110 (h)	280 (h)	340 (h)	720 (h)	5,867 (b)	813 (b)	1,002 (h)
2011	124,931	369 (h)			912 (h)	6,180 (b)	2,092 (b)	575 (h)
2012	106,782		106 (h)		405 (h)	5,230 (b)	396 (h)	515 (h)
2013	84,795	721 (h)		55 (h)	425 (h)	6,222 (b)	2,221 (h)	647 (h)

-continued-

Year	Yukon River Mainstem Sonar Estimate [a]	Nenana River Drainage				Upper Tanana River Drainage		
		Lost Slough	Nenana Mainstem [b]	Wood Creek	Seventeen Mile Slough	Delta Clearwater River [c]	Clearwater Lake and Outlet	Richardson Clearwater River
2014	247,047	333 (h)	378 (h)	649 (h)	886 (h)	4,285 (b)	434 (h)	886 (h)
2015	97,587 [k]	242 (h)	1,789 (h)	1,419 (h)	3,890 (h)	19,533 (b)	1,621 (h)	3,742 (h)
SEG						5,200-17,000 [l]		
Averages								
1972-2014	145,853 [j]	828	897	1,320	1,472	15,700	2,167	1,283
2005-2014	149,354 [j]	552	473	545	1,322	11,783	2,123	689
2010-2014	144,199 [j]	633	255	348	670	5,557	1,191	725
Minimum-14	60,886	0	68	55	27	632	229	80
Maximum-14	265,119	4,169	2,771	8,826	4,535	102,800	8,800	8,626

Note: Only peak counts presented. Survey rating is fair to good, unless otherwise noted. Denotations of survey methods include: (b)=boat, (f)=fixed wing, (g)=ground/foot, (h)=helicopter, and (u)=undocumented. Minimum and maximum indicate year with the lowest and highest values through 2014.

[a] Passage estimates for coho salmon are incomplete. The sonar project is terminated prior to the end of the coho salmon run.

[b] Index area includes mainstem Nenana River between confluence's of Lost Slough and Teklanika River.

[c] Index area is lower 17.5 miles of system.

[d] Poor survey, resulted in minimal count.

[e] Weir was operated at the mouth of Clear Creek (Shores Landing).

[f] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977–1980.

[g] Weir project terminated on October 4, 1993. Weir normally operated until mid- to late October.

[h] Weir project terminated September 27, 1994. Weir normally operated until mid- to late October.

[i] No survey of Wood Creek due to obstructions in creek.

[j] The mainstem Yukon River sonar operated near Pilot Station encountered record low water levels during the fall season causing difficulties with species apportionment and catchability. Coho salmon are suspected of being over estimated therefore this value should not be used in averages or run reconstructions.

[k] Data preliminary.

[l] Sustainable escapement goal (SEG) established January 2004, (replaces BEG of greater than 9,000 fish established March, 1993) based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21–27.

Appendix B18.–Stock percentage estimates of all samples collected from Chinook salmon migrating across the mainstem U.S./Canada border, Yukon River, 2005–2015, unweighted by sonar passage periods.

	Region							
Year	Upper Yukon Tributaries	Teslin River	Carmacks Tributaries	Mid-Mainstem	Pelly River	Stewart River	North Yukon Tributaries	White River
2005 [a, b]	5.6%	19.2%	24.6%	11.1%	17.5%	9.1%	12.5%	0.5%
2006 [a, b]	6.1%	13.0%	33.0%	10.2%	12.4%	13.4%	10.3%	1.7%
2007 [a, c]	2.4%	19.0%	21.7%	9.2%	20.9%	14.2%	11.5%	1.1%
2008 [a, d]	0.0%	14.7%	20.4%	11.6%	23.9%	13.1%	14.6%	1.7%
2008 [c, d]	1.6%	16.4%	10.8%	33.5%	12.1%	7.2%	8.3%	10.1%
2009 [c, d]	3.3%	25.6%	16.0%	10.5%	16.2%	9.3%	12.7%	6.4%
2010 [c, d]	7.5%	33.0%	13.1%	19.6%	9.3%	7.5%	4.6%	5.4%
2011 [c, d]	4.8%	25.3%	9.6%	22.9%	17.2%	6.0%	8.1%	6.3%
2012 [c, b]	6.4%	37.8%	13.0%	18.8%	9.7%	6.4%	3.6%	4.3%
2013 [c, b]	6.7%	25.6%	18.5%	28.6%	11.5%	5.3%	0.7%	3.2%
2014 [c, d]	4.1%	28.2%	14.3%	23.6%	14.4%	7.4%	3.1%	4.9%
2015 [c, e]	4.6%	25.4%	17.5%	16.0%	18.2%	8.2%	4.4%	5.6%
Average (2008–2014) [c]	4.9%	27.4%	13.6%	22.5%	12.9%	7.0%	5.9%	5.6%
Minimum (2008–2014) [c]	1.6%	16.4%	9.6%	10.5%	9.3%	5.3%	0.7%	3.2%
Minimum (2008–2014) [c]	7.5%	37.8%	18.5%	33.5%	17.2%	9.3%	12.7%	10.1%

[a] Samples from BioIsland site collected from fish wheels.

[b] Samples were run against the current year's baseline.

[c] Samples collected from the drift gillnet test fishery at the mainstem Yukon River sonar near Eagle may not be comparable to those collected at the fish wheels because of the proportion of Chinook salmon migrating offshore. Average, minimum, and maximum were calculated using Eagle sonar samples only.

[d] Samples were run against the 2011 baseline.

[e] Samples were run against the 2015 baseline.

Appendix B19.–Stock percentage estimates of fall chum salmon migrating across the mainstem U.S./Canada border, Yukon River, 2005–2015,unweighted by sonar passage periods.

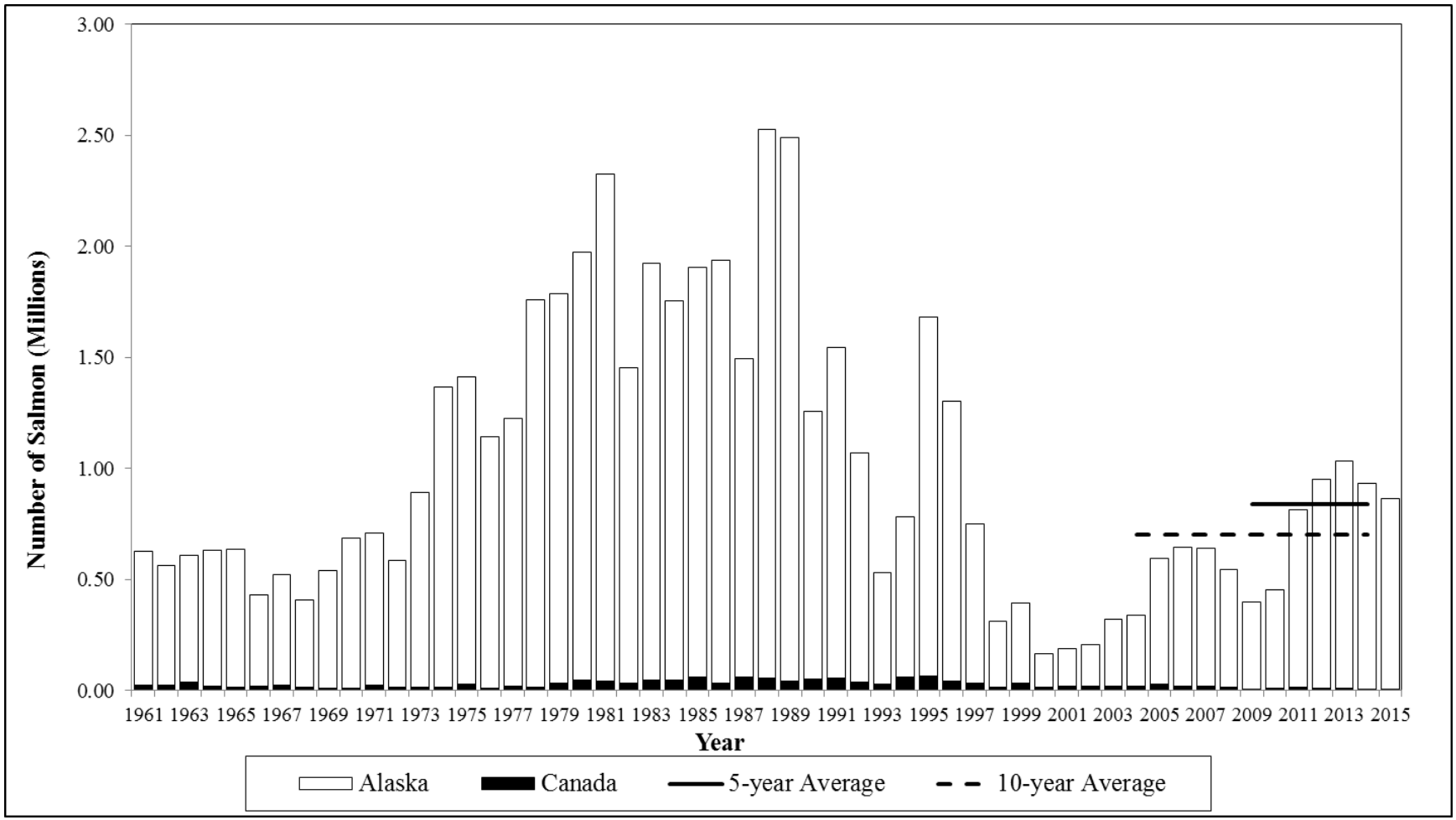
	Region			
Year	Mainstem	White	Teslin	Yukon Early
2005 [a]	67.7%	29.8%	0.4%	2.1%
2006 [a]	41.0%	54.9%	3.1%	1.0%
2007 [a]	46.9%	52.1%	0.5%	0.5%
2008 [a]	48.0%	49.9%	2.1%	0.1%
2009 [b]	68.3%	30.6%	1.0%	0.1%
2010 [b]	52.8%	46.3%	0.2%	0.7%
2011 [b]	51.2%	48.0%	0.7%	0.1%
2012 [b]	47.3%	52.6%	0.1%	0.1%
2013 [b]	50.5%	48.9%	0.4%	0.2%
2014 [b]	49.5%	50.1%	0.0%	0.2%
2015 [b]	61.9%	37.2%	0.1%	0.8%
Average (2009–2014)	53.3%	46.1%	0.4%	0.2%
Minimum (2009–2014)	47.3%	30.6%	0.0%	0.1%
Maximum (2009–2014)	68.3%	52.6%	1.0%	0.7%

Note: Samples were run against the current year's baseline (ex. 2005 samples were run against the 2005 baseline).

[a] Samples from BioIsland site collected from fish wheels.

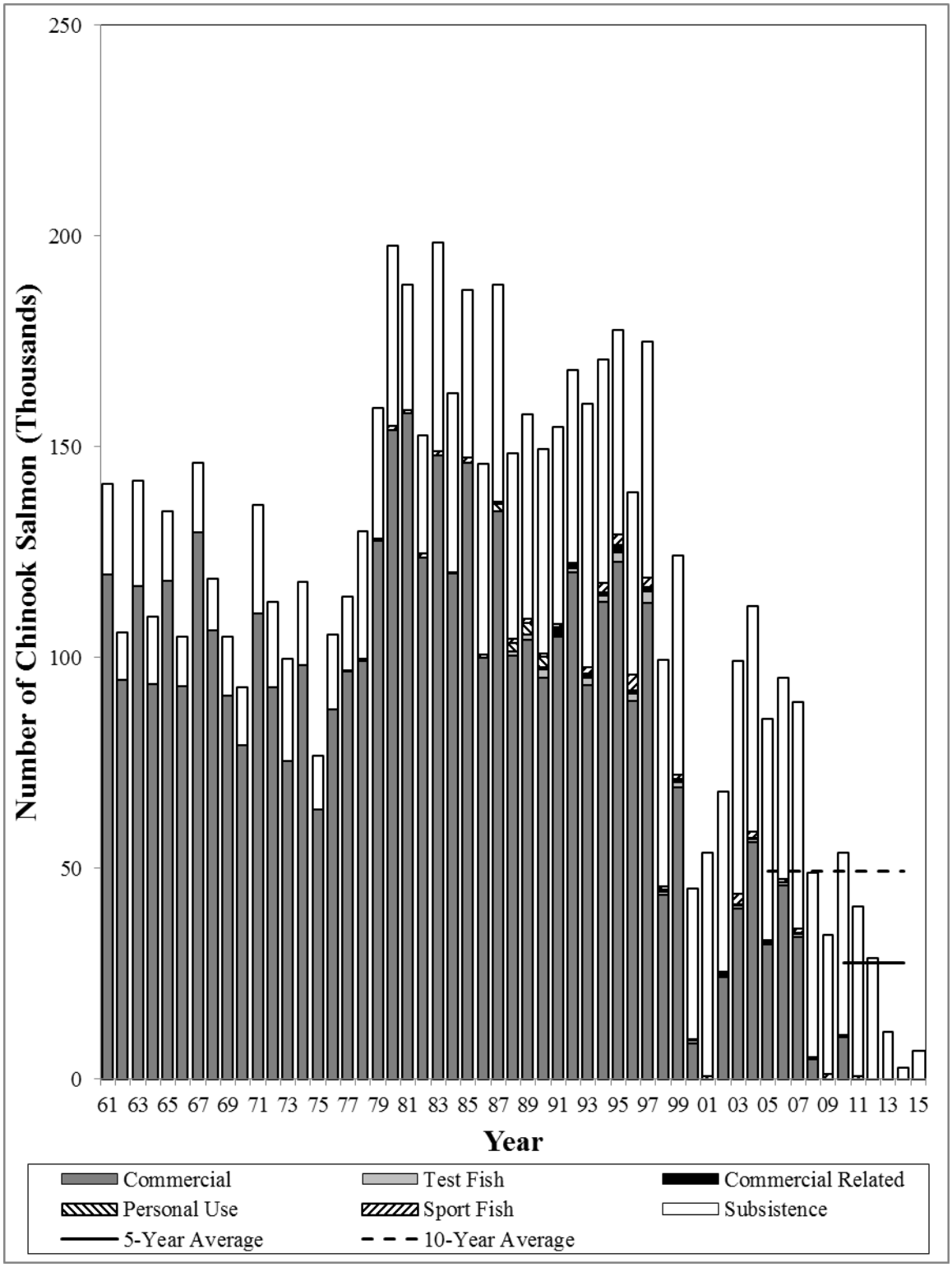
[b] Samples from the mainstem Yukon River sonar operated near Eagle collected from the drift test fishery.

APPENDIX C: FIGURES



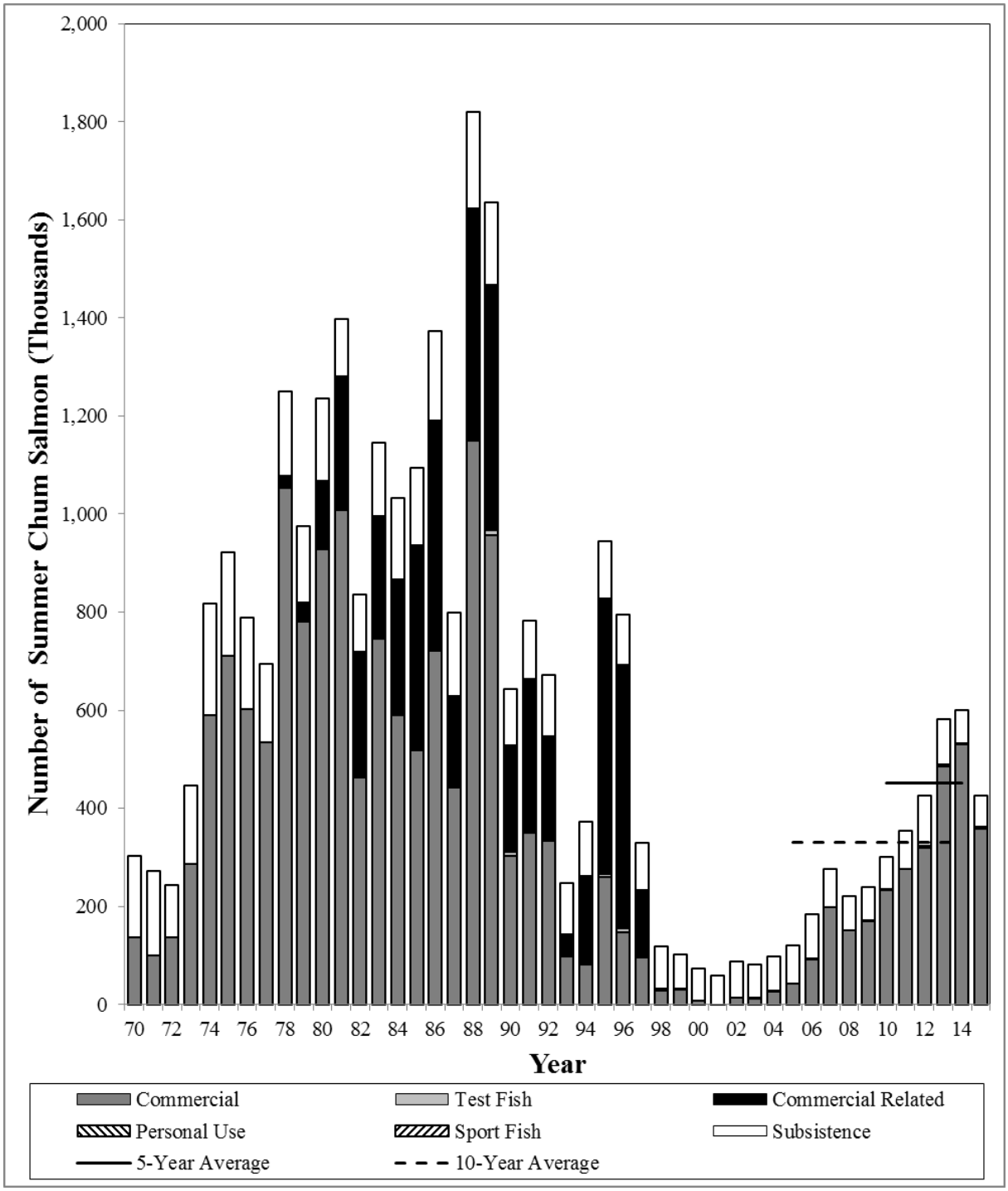
Note: Subsistence harvest estimates of fall chum and coho salmon are minimal prior to 1979 because of timing of harvest surveys. The 2014–2015 harvest estimates are preliminary.

Appendix C1.–Total utilization of Chinook, chum and coho salmon, Yukon River, 1961–2015.



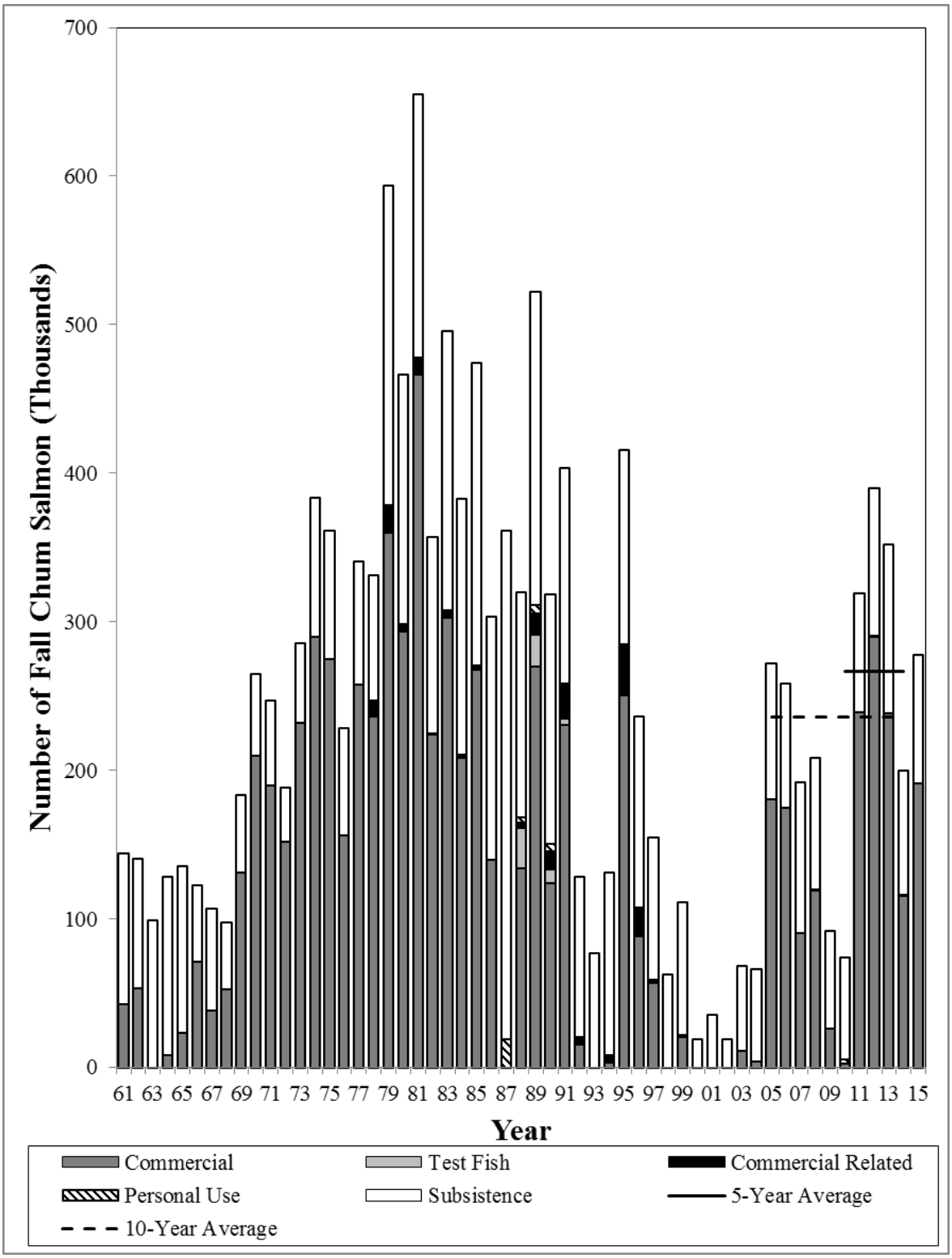
Note: No commercial fishery occurred in 2001. The 2014–2015 harvest estimates are preliminary.

Appendix C2.–Alaska harvest of Chinook salmon, Yukon River, 1961–2015.



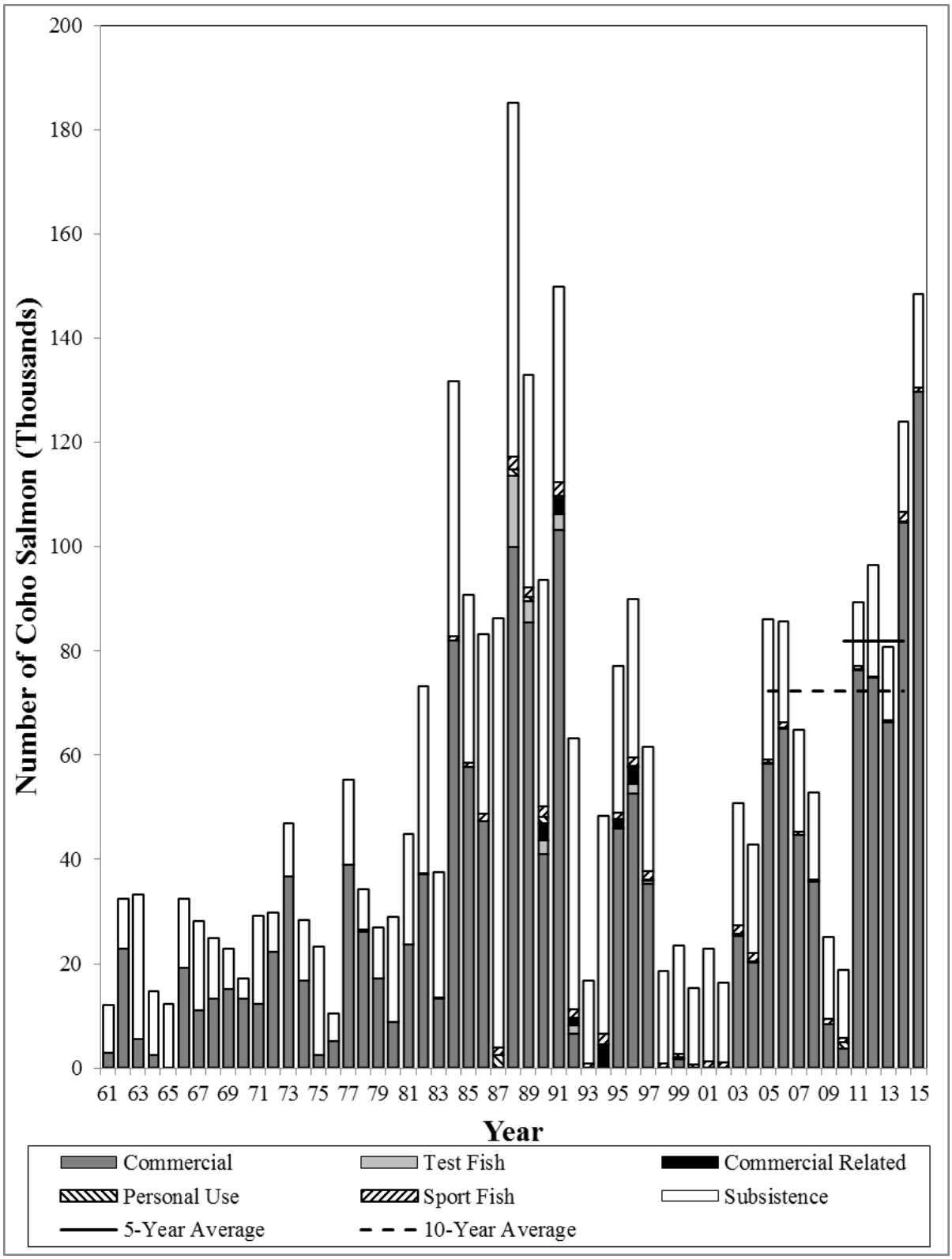
Note: The 2014–2015 harvest estimates are preliminary.

Appendix C3.–Alaska harvest of summer chum salmon, Yukon River, 1970–2015.



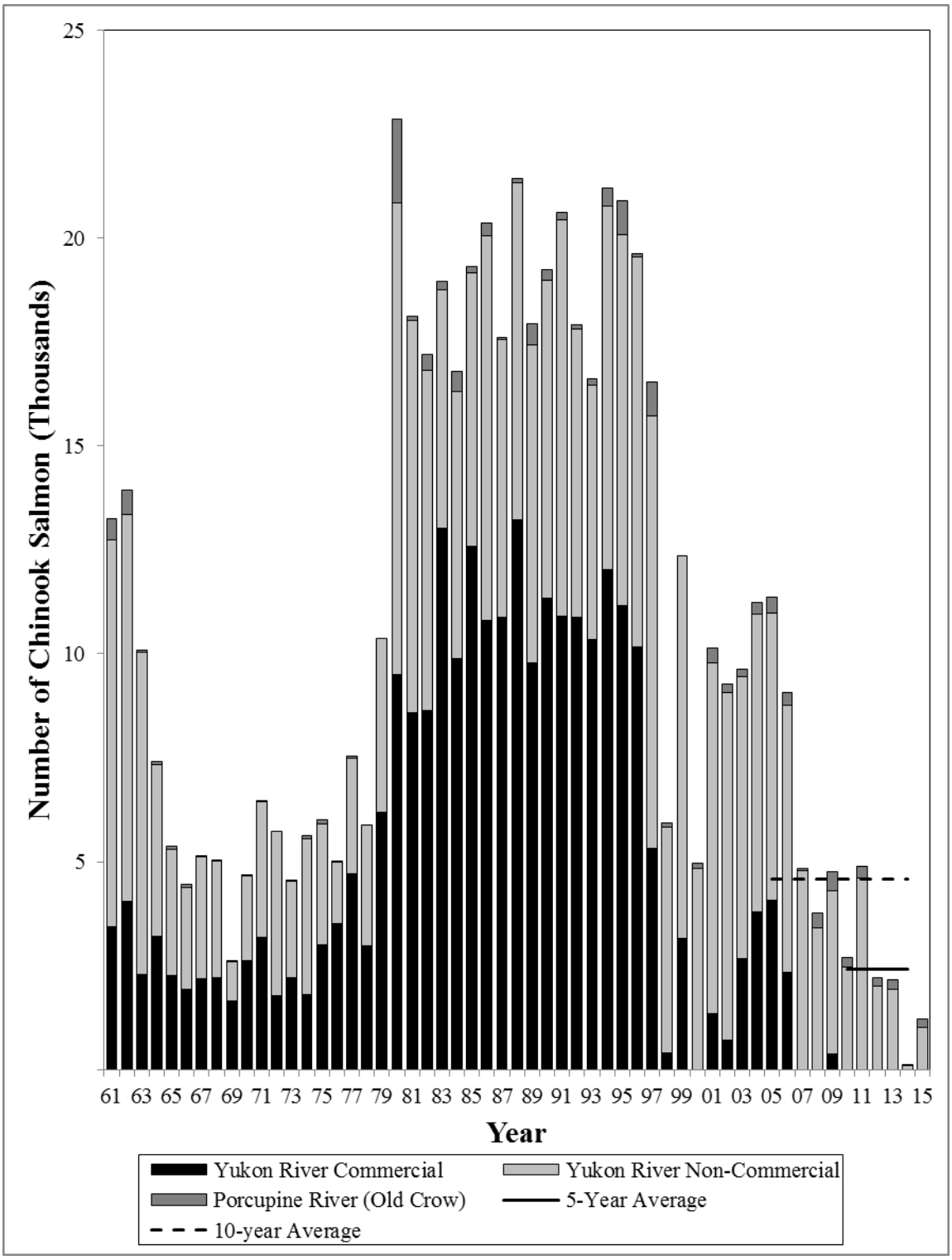
Note: Subsistence harvest estimates of fall chum salmon are minimal prior to 1979 because of timing of harvest surveys. The commercial fishery was closed 2000–2002. The 2014–2015 harvest estimates are preliminary.

Appendix C4.–Alaska harvest of fall chum salmon, Yukon River, 1961–2015.

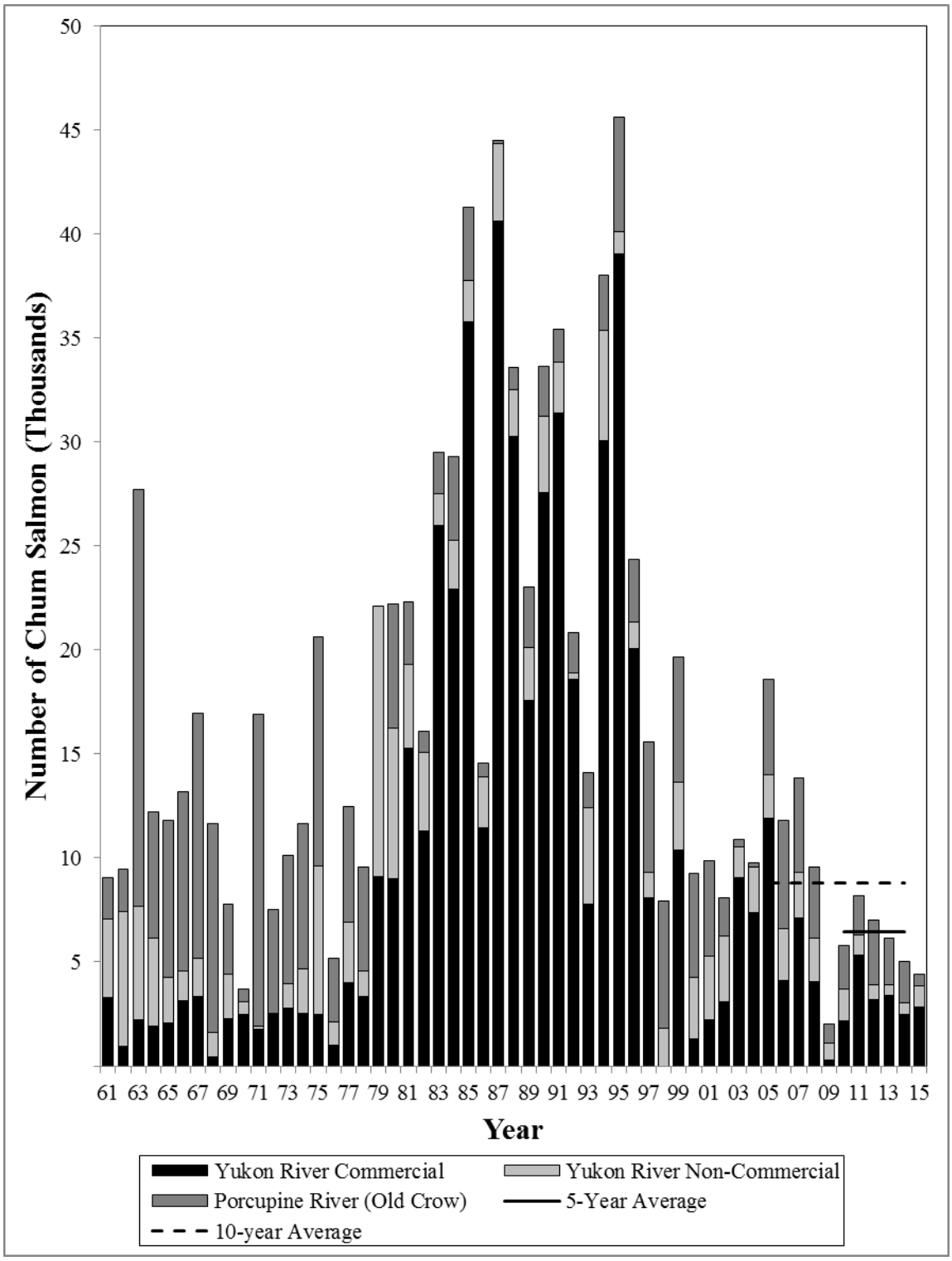


Note: Subsistence harvest estimates of coho salmon are minimal prior to 1979 because of timing of harvest surveys. The commercial fishery was closed 2000–2002. The 2015 harvest estimates are preliminary.

Appendix C5.–Alaska harvest of coho salmon, Yukon River, 1961–2015.

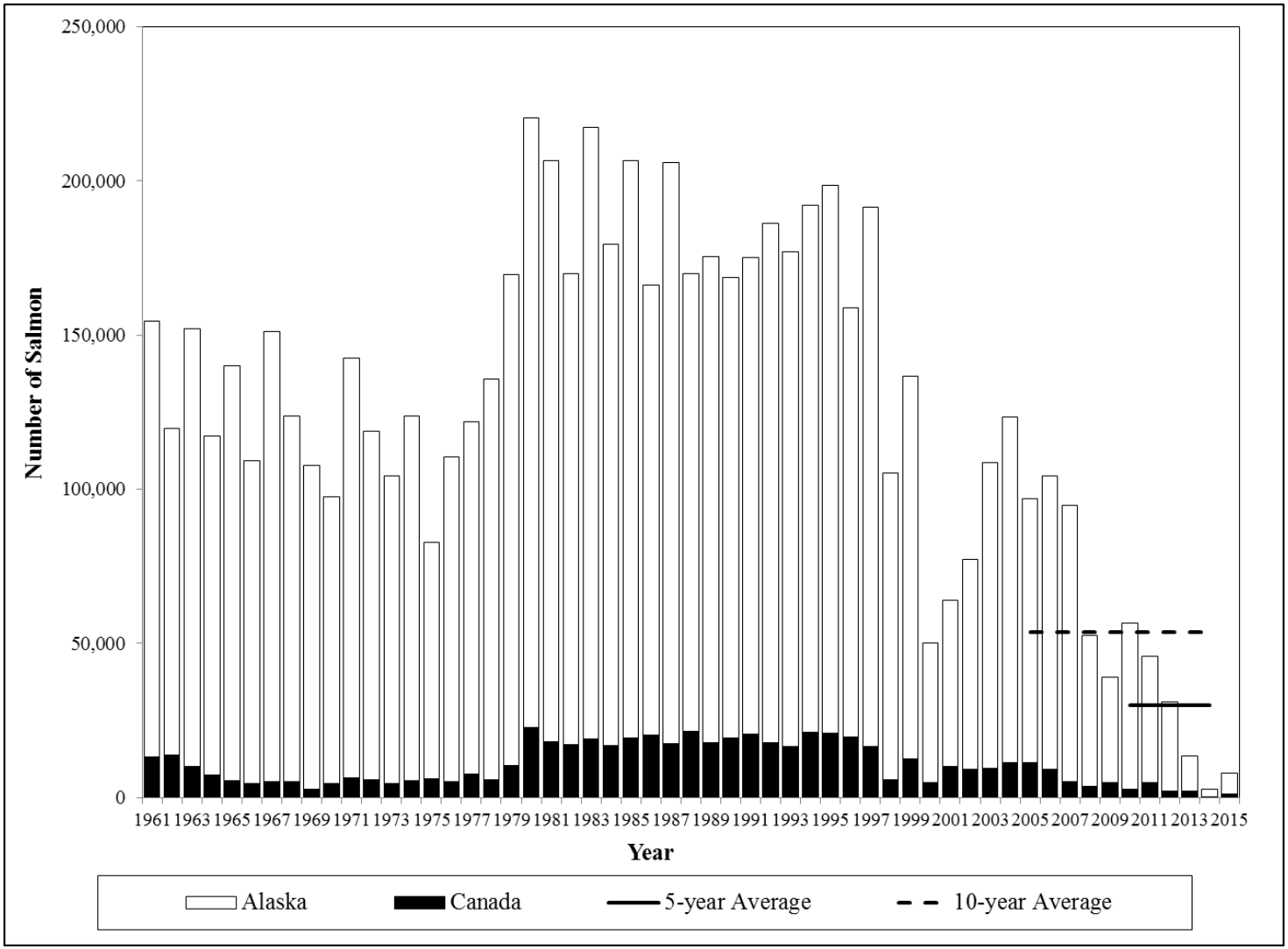


Appendix C6.–Canadian harvest of Chinook salmon, Yukon River, 1961–2015.



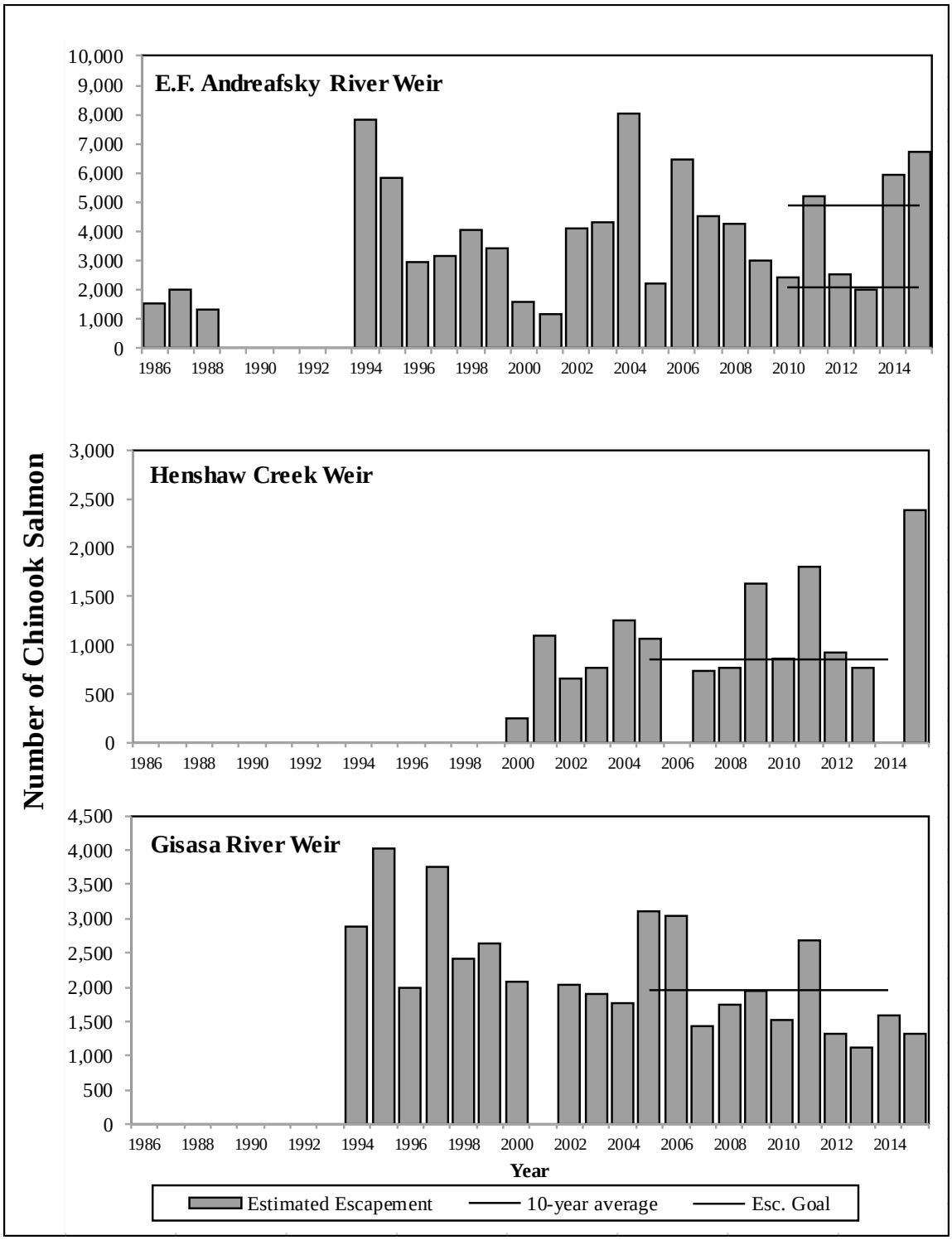
Note: The 2015 harvest estimates are preliminary.

Appendix C7.–Canadian harvest of fall chum salmon, Yukon River, 1961–2015.



Note: The 2014–2015 harvest estimates are preliminary.

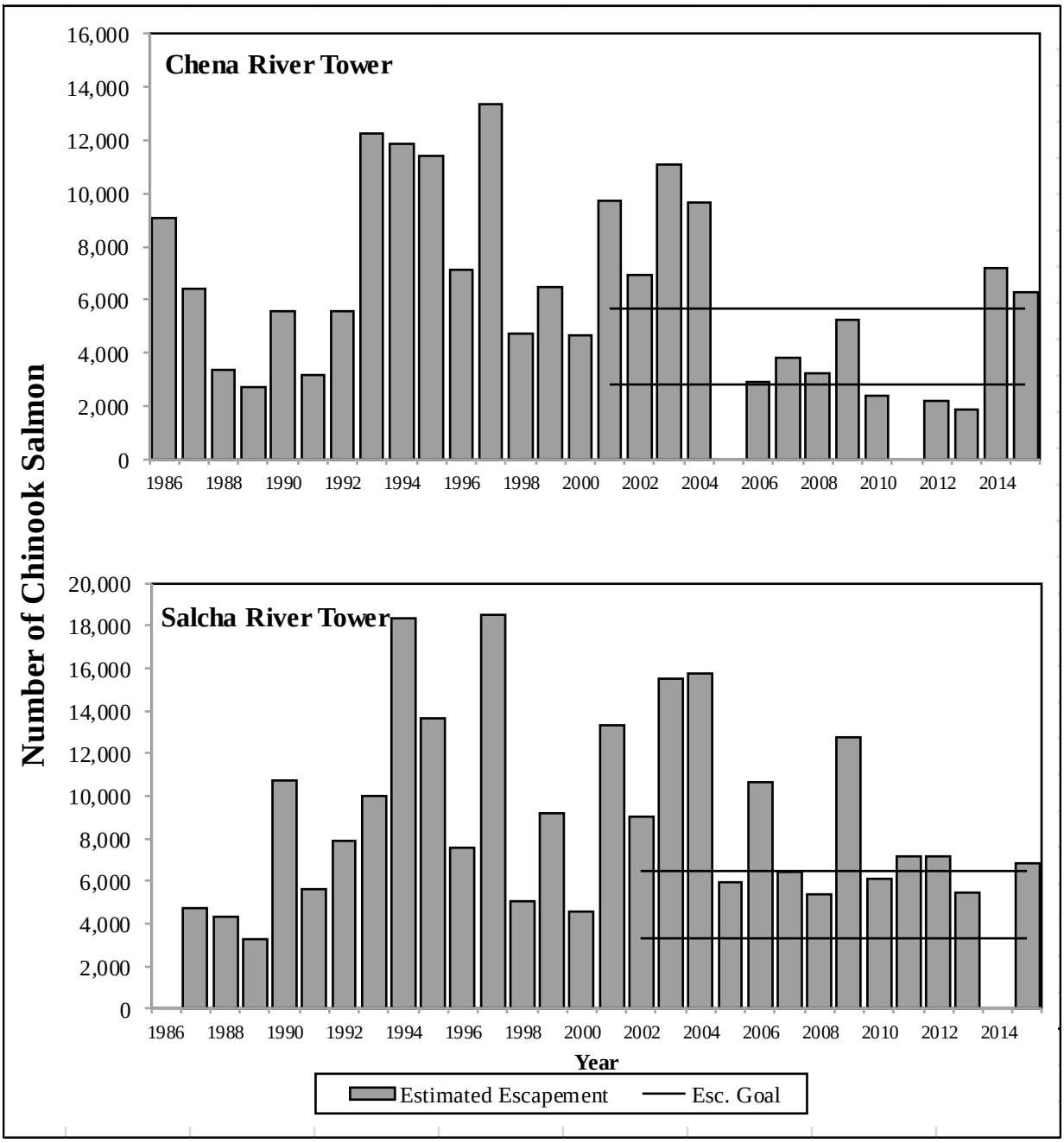
Appendix C8.–Total utilization of Chinook salmon, Yukon River, 1961–2015.

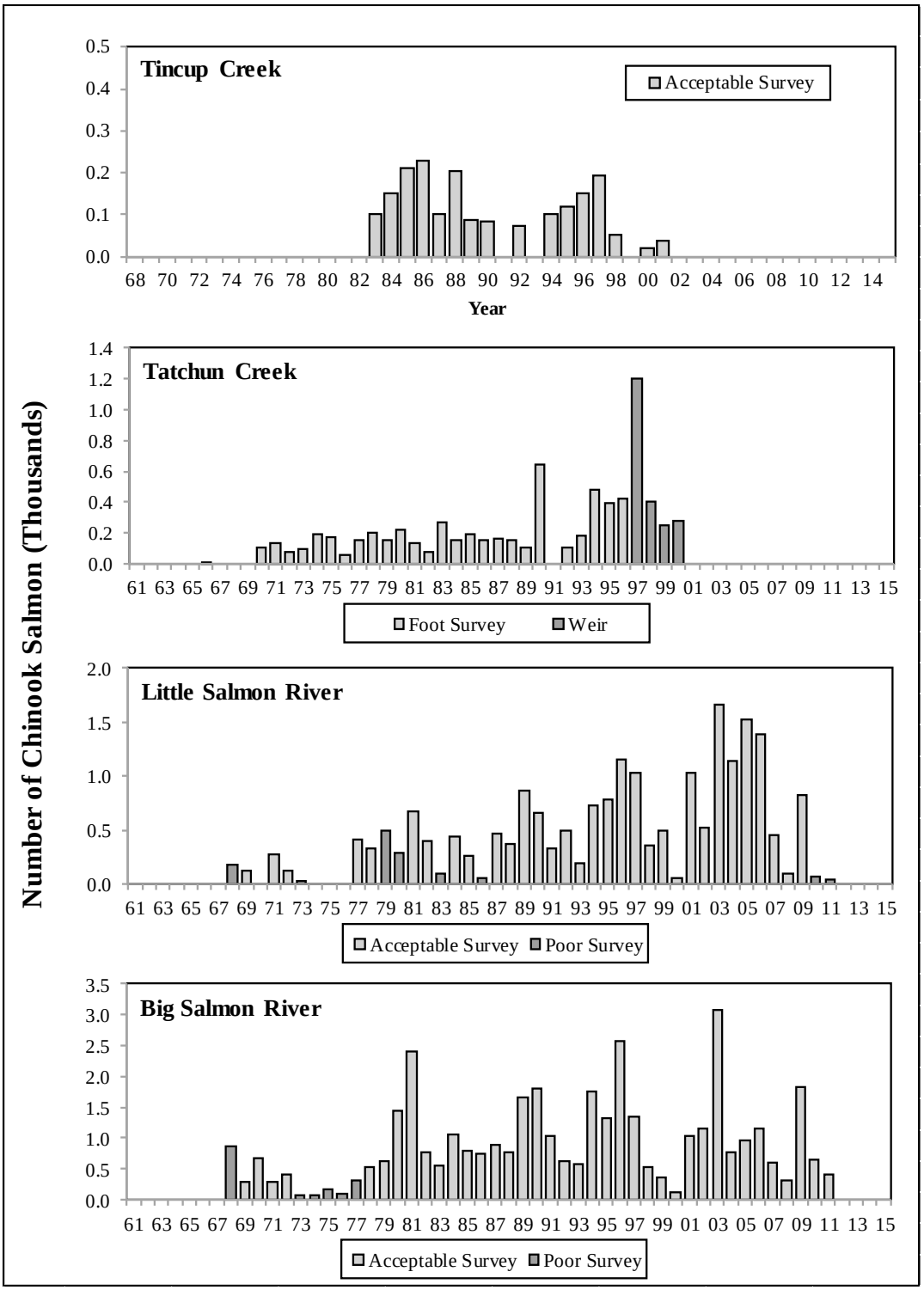


Note: Incomplete counts caused by late installation and/or early removal of project or high water events are excluded from the graphs. Vertical scale is variable. Esc. = escapement relative to years applied as either minimums or ranges.

Appendix C9.–Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986–2015.

-continued-

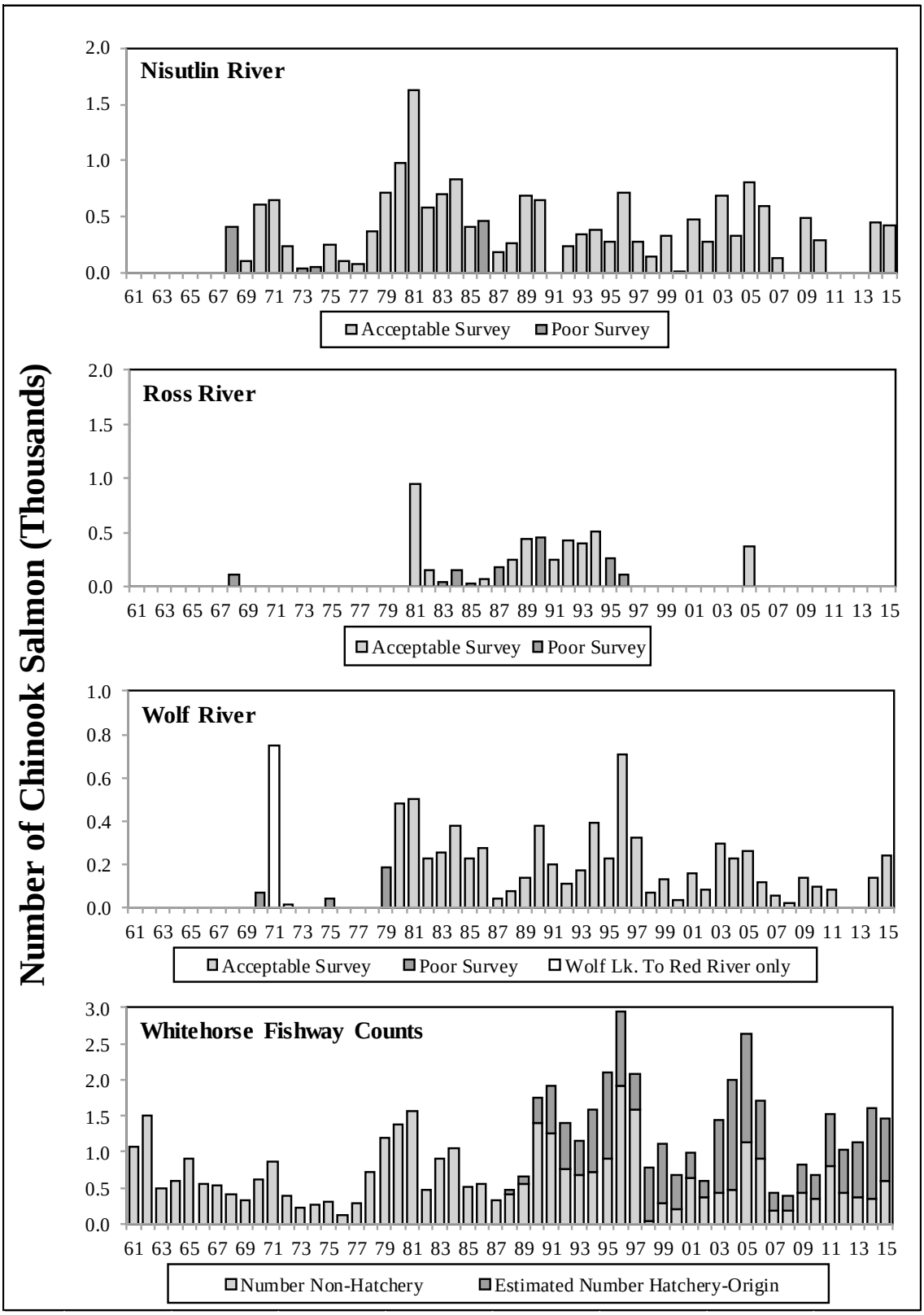

Chena River Tower
Salcha River Tower
Number of Chinook Salmon
Year
Estimated Escapement
Esc. Goal
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

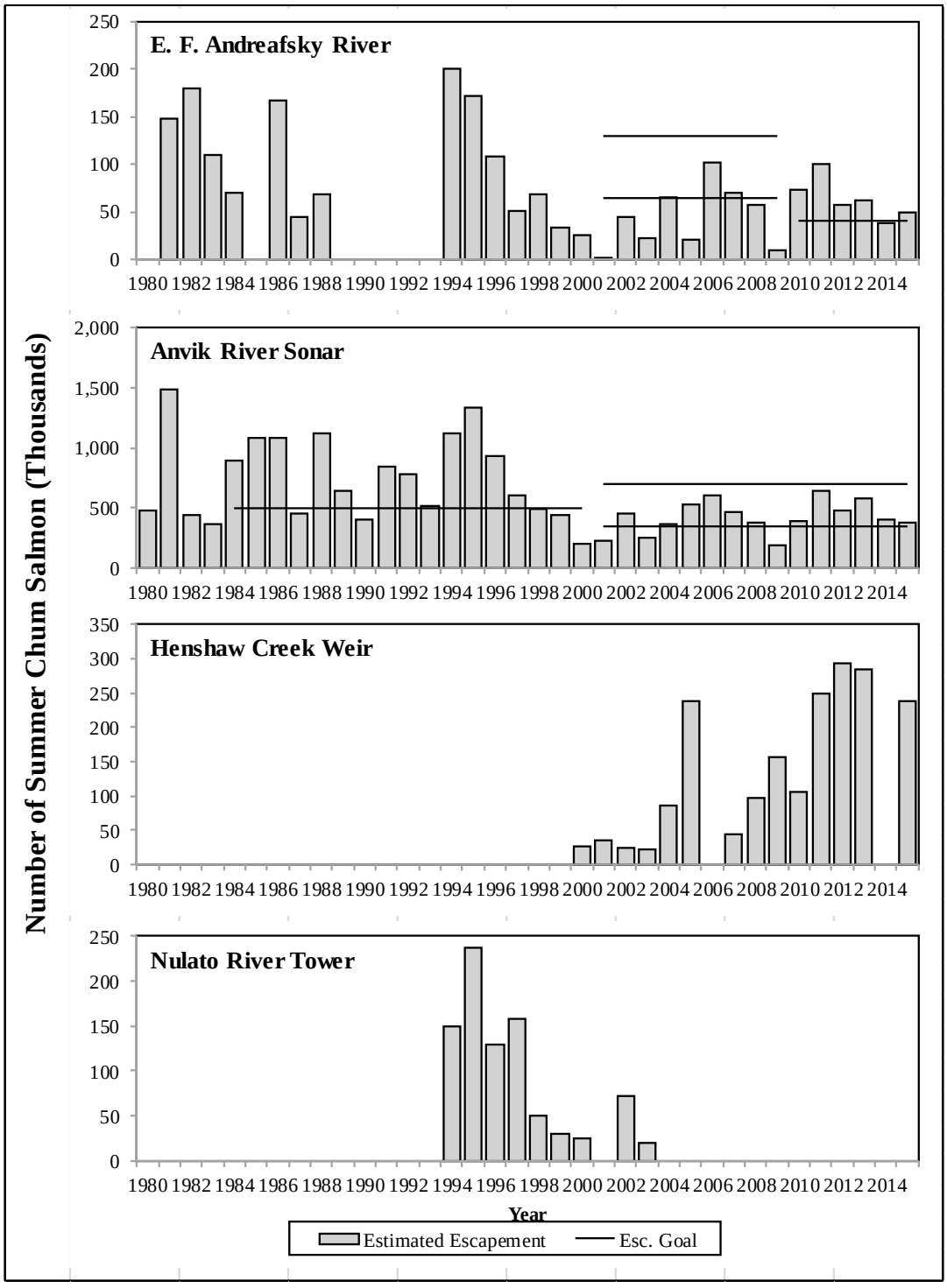


Note: Estimates are aerial survey observations unless noted otherwise. Vertical scale is variable.

Appendix C10.–Chinook salmon escapement estimates for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2015.

-continued-

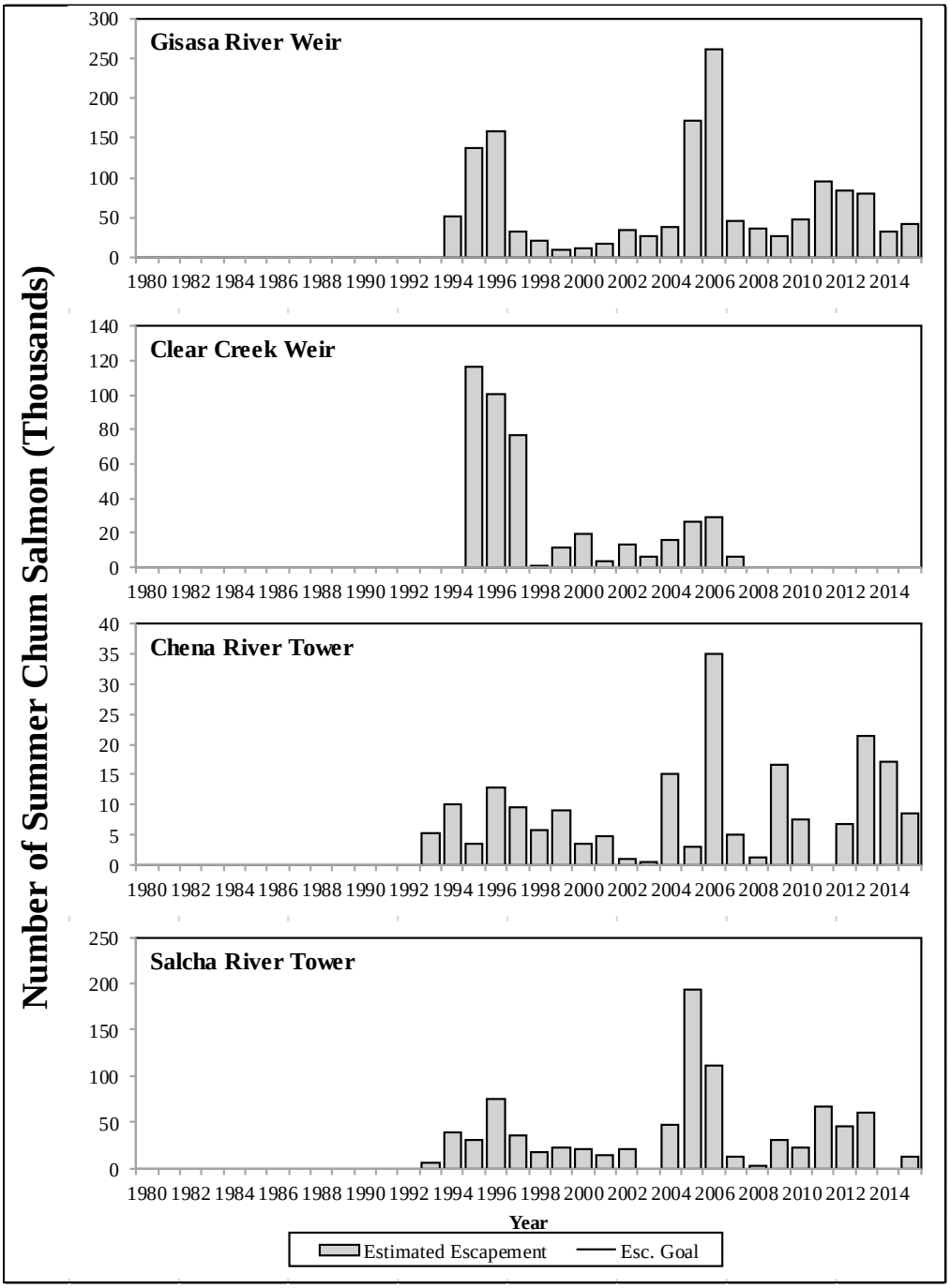

Number of Chinook Salmon (Thousands)
Nisutlin River
2.0
1.5
1.0
0.5
0.0
61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11 13 15
Acceptable Survey
Poor Survey
Ross River
2.0
1.5
1.0
0.5
0.0
61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11 13 15
Acceptable Survey
Poor Survey
Wolf River
1.0
0.8
0.6
0.4
0.2
0.0
61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11 13 15
Acceptable Survey
Poor Survey
Wolf Lk. To Red River only
Whitehorse Fishway Counts
3.0
2.5
2.0
1.5
1.0
0.5
0.0
61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03 05 07 09 11 13 15
Number Non-Hatchery
Estimated Number Hatchery-Origin

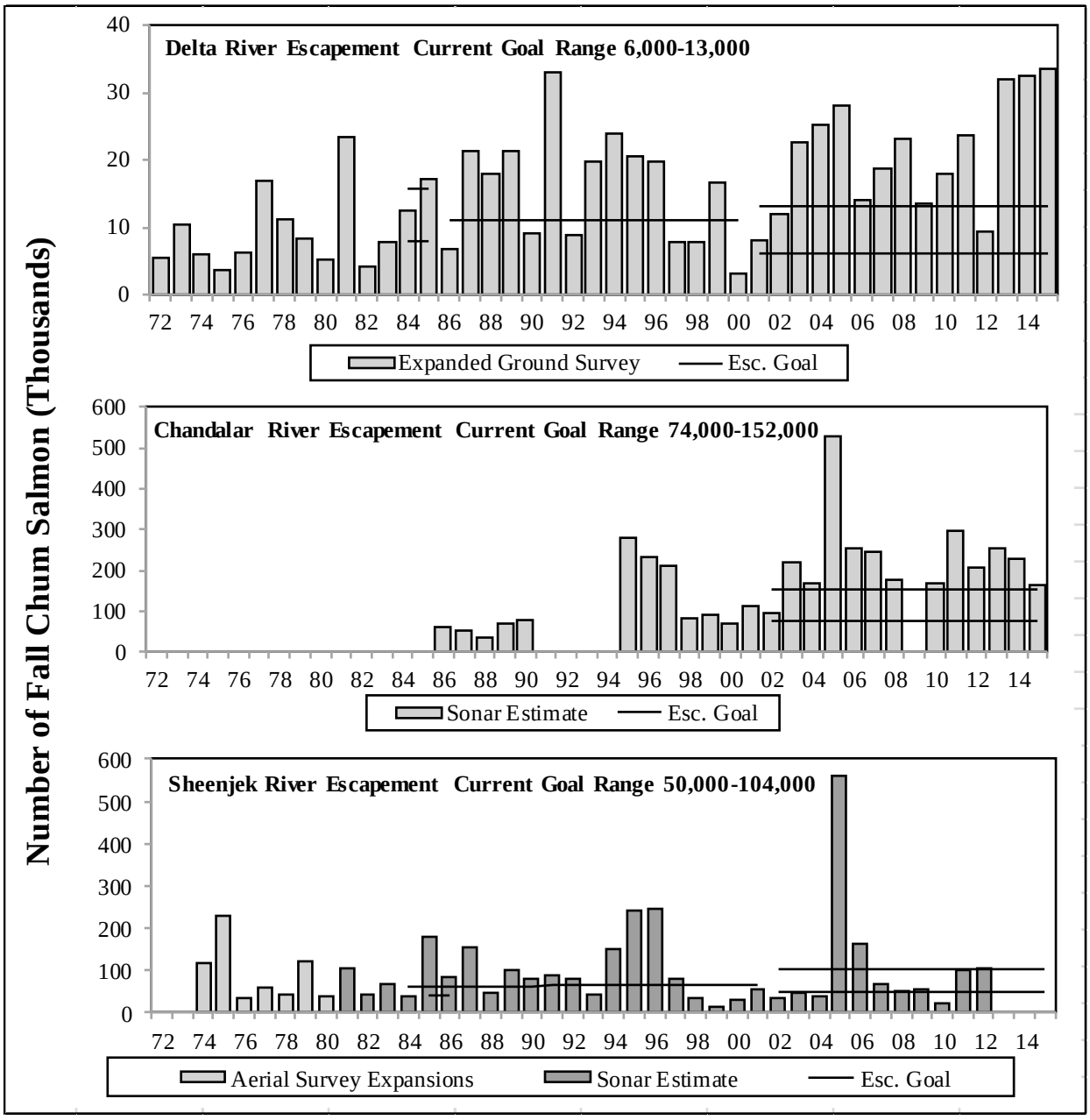


Note: Incomplete counts caused by late installation and/or early removal of project or high water events are excluded from graphs. The vertical scale is variable. Esc. = escapement relative to years applied as either minimums or ranges.

Appendix C11.–Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980–2015.

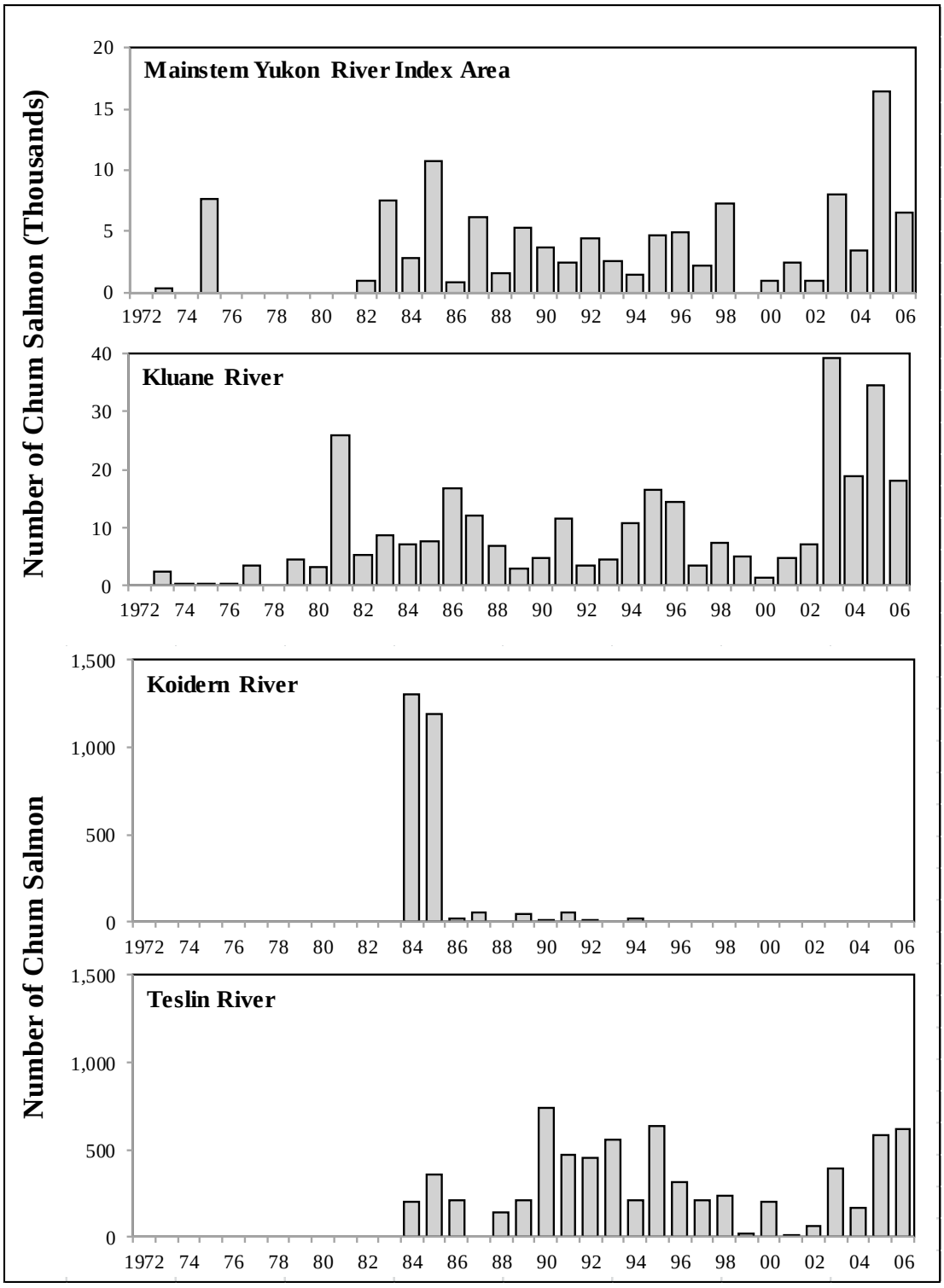
-continued-


Number of Summer Chum Salmon (Thousands)
Gisasa River Weir
Clear Creek Weir
Chena River Tower
Salcha River Tower
Year
Estimated Escapement
Esc. Goal



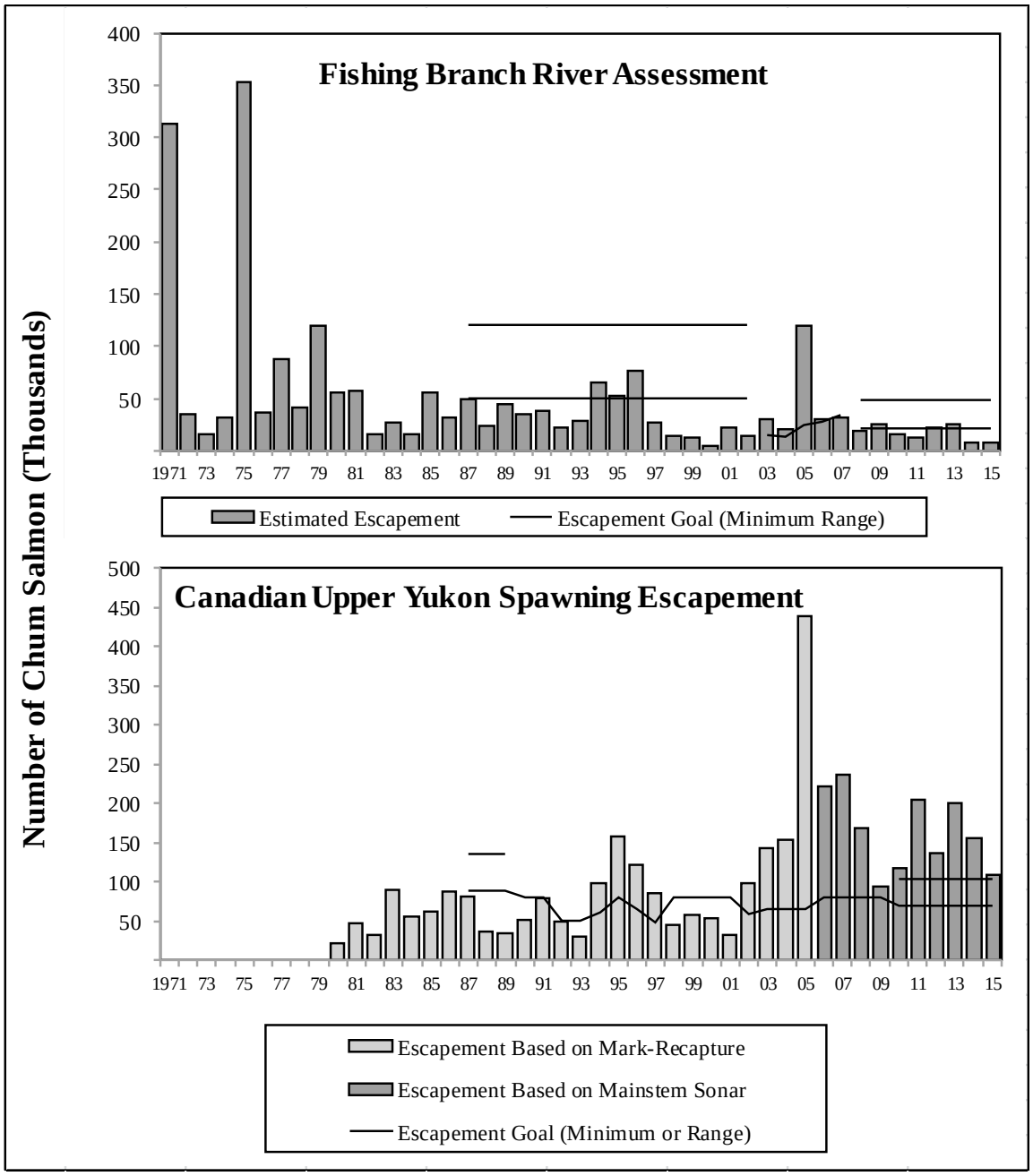
Note: Horizontal lines represent escapement goals or ranges. The vertical scale is variable. Esc. = escapement relative to years applied as either minimums or ranges.

Appendix C12.–Fall chum salmon escapement estimates for selected spawning areas in the Alaska portion of the Yukon River drainage, 1972–2015.



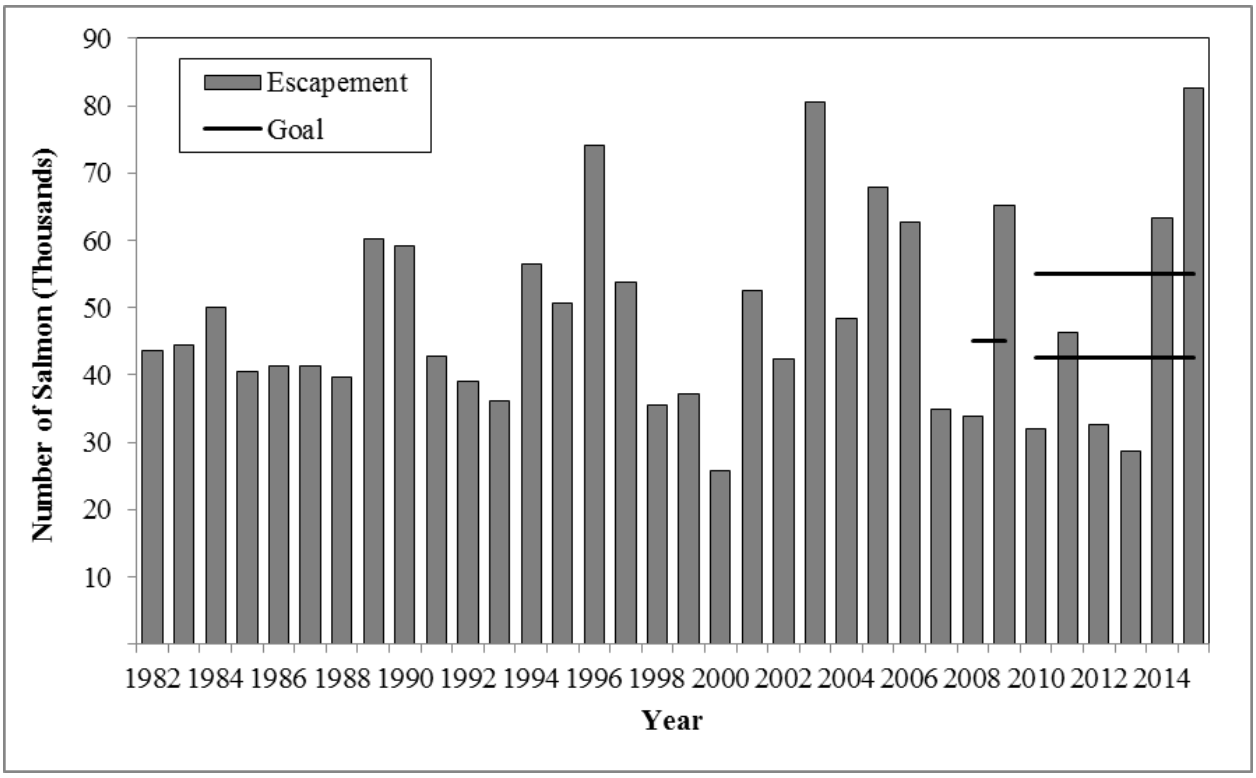
Note: The vertical scales vary. Genetic stock identification was used to determine relative tributary spawning abundance from 2007 to present (not depicted see Appendix C18).

Appendix C13.–Fall chum salmon aerial survey estimates for selected spawning areas in the Canadian portion of the Yukon River drainage, 1972–2006.



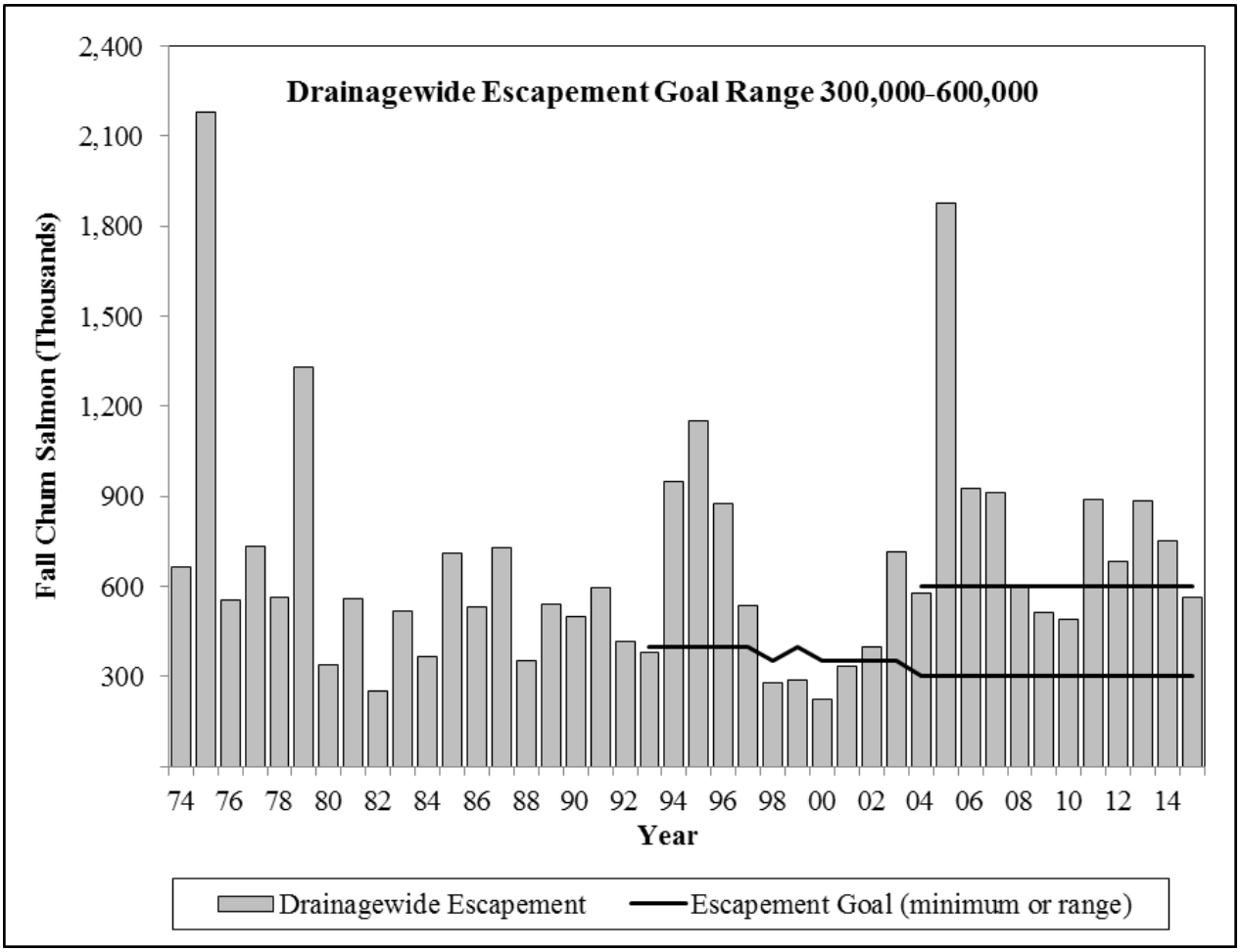
Note: Horizontal lines represent escapement goals which include rebuilding and interim stabilization goals. The treaty goal for the Fishing Branch River is 50,000-120,000 fish and the treaty goal for the Canadian mainstem is at least 80,000.

Appendix C14.–Fall chum salmon spawning escapement estimates for Canadian portion of the Yukon River drainage, 1971–2015.

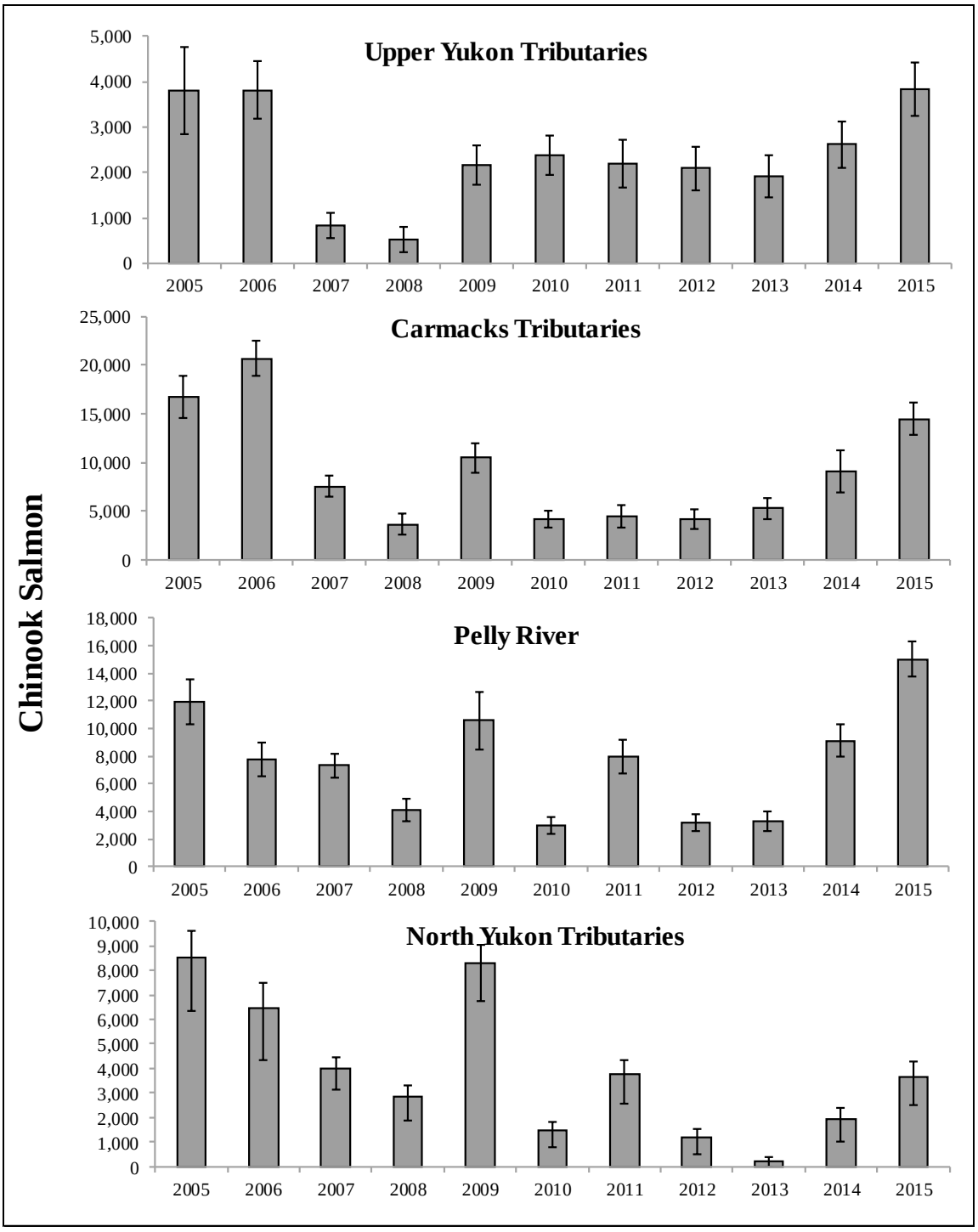


Note: The JTC adopted a revised escapement database in March 2008. The 2008 and 2009 interim management escapement goal (IMEG) was set at 45,000. The IMEG for 2010–2014 was 42,500 to 55,000 salmon.

Appendix C15.–Estimated total Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982–2015.



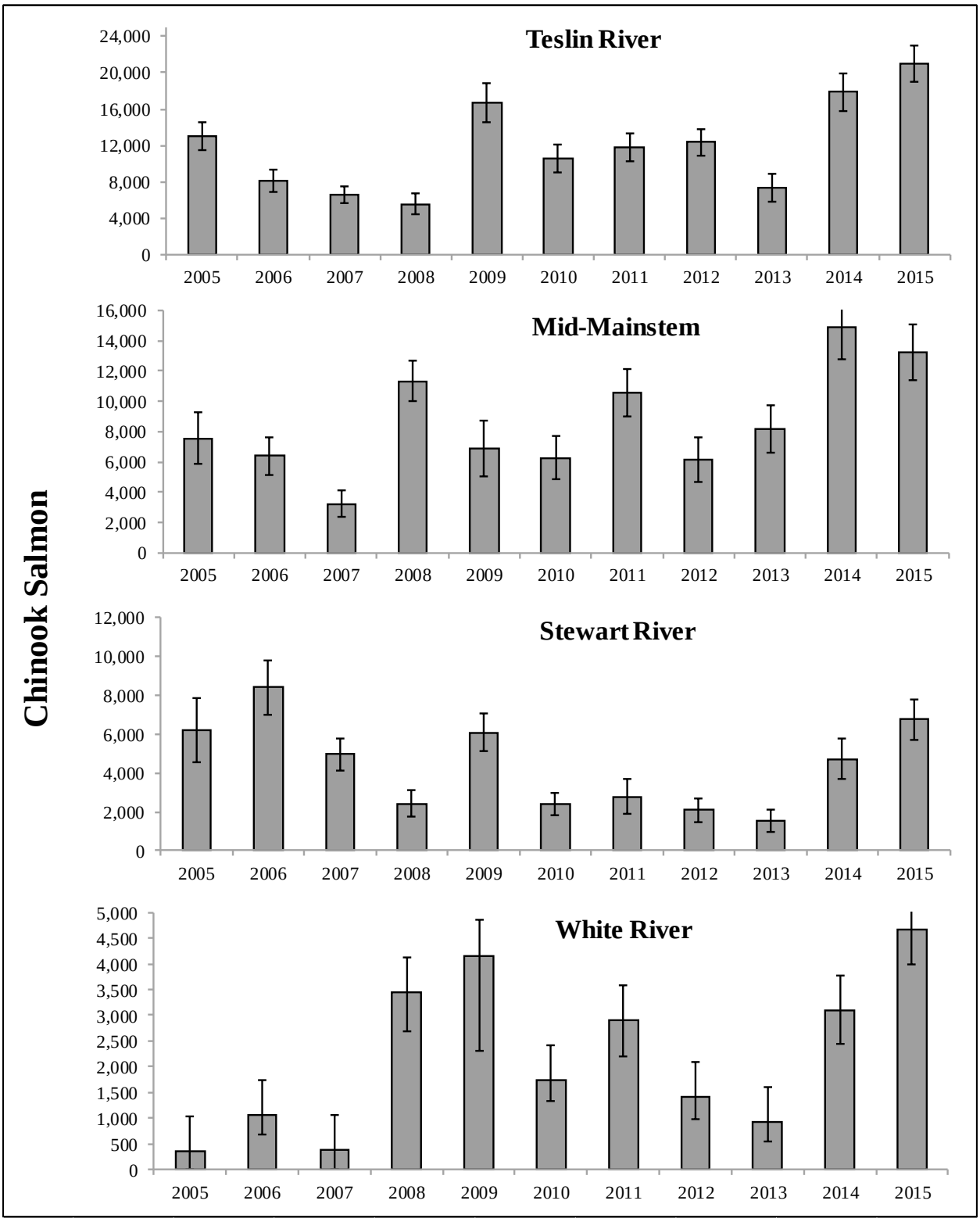
Appendix C16.–Estimated drainagewide escapement of fall chum salmon, Yukon River, 1974–2015.

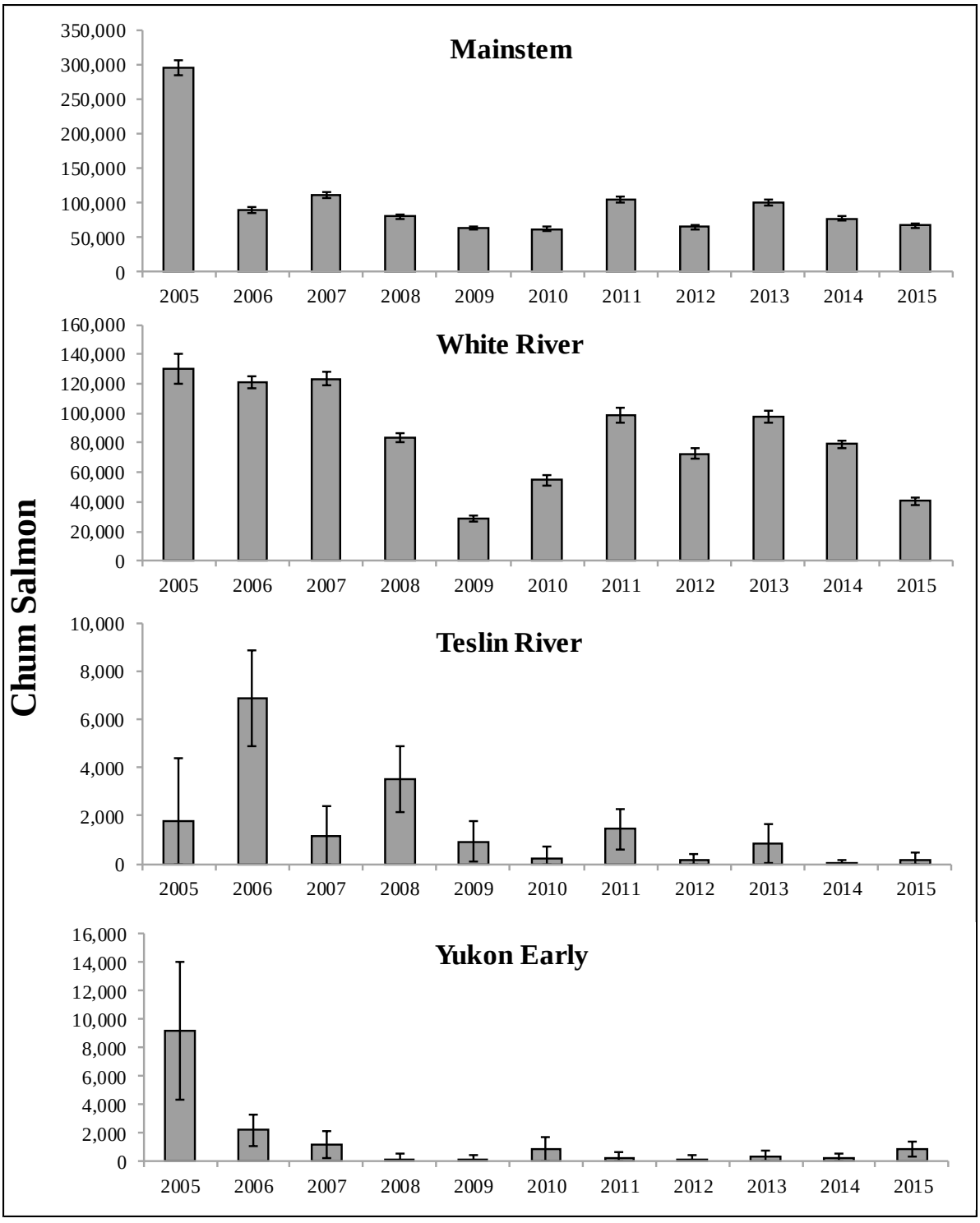


Note: Genetic estimates are based on samples from fish wheels at BioIsland, 2005–2008, all other years genetic estimates are from the drift gillnet test fishery associated with the mainstem Yukon River sonar operated near Eagle.

Appendix C17. Estimated Chinook salmon spawning escapement to regions represented in the genetic baselines, Yukon River, 2005–2015.

-continued-


Chinook Salmon
Teslin River
24,000
20,000
16,000
12,000
8,000
4,000
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Mid-Mainstem
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Stewart River
12,000
10,000
8,000
6,000
4,000
2,000
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
White River
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015



Note: Genetic estimates are based on samples from fish wheels at BioIsland, 2005–2008, all other years genetic estimates are from the drift gillnet test fishery associated with the mainstem Yukon River sonar operated near Eagle.

Appendix C18.–Estimated fall chum salmon spawning escapement to regions represented in the genetic baselines, Yukon River, 2005–2015.

APPENDIX D: JTC 2015 SEASON MANAGEMENT REVIEW AND 2016 OUTLOOKS

Appendix D1.–Summary of Joint Technical Committee information on fisheries management, escapement, other assessment programs, and harvests for the 2015 season and outlooks for the 2016 season.

Duties delegated to the Yukon River Joint Technical Committee (JTC) include the review of research, assessment methods, and other information relating to salmon migration, abundance, escapement, and status of individual stocks; and fishery performance, harvest rates, and management programs. The JTC produces this annual report to provide preliminary harvest and escapement assessments from the previous season; preseason and inseason management strategies; and information about assessment and research programs focused on salmon stocks which spawn in the upper Yukon River drainage in Canada. This appendix to the report is provided at the request of the Yukon River Panel (Panel) to summarize specific information about management strategies and outcomes. The JTC reminds readers that this appendix is a brief summary of information contained in the report, and further details, context, and background information can be found in the main body of the report, along with Appendices A–C which contains numerous tables and figures. The JTC also cautions readers that the management targets presented here are not based on systematic analyses of biological information about the stocks, but represent targets set in the Yukon River Salmon Agreement and by Panel decisions.

JOINT TECHNICAL COMMITTEE REVIEW OF ASSESSMENT INFORMATION AND MANAGEMENT STRATEGIES

The JTC met in November 2015 and February 2016. The fall meeting is typically focused on postseason reviews of management and harvests, stock assessment, escapement, and marine fisheries and surveys information presented by research and management biologists and other specialists in both Alaska and Canada. At the time of the fall meeting, data and estimates from seasonal assessments and projects may not have been completed, quality controlled, or finalized and reports are focused on activities and preliminary results. In the spring meeting, more definitive postseason reviews can be provided and pre-season outlooks and management strategies are discussed in preparation for the Yukon River Panel spring meeting. However, readers are cautioned that information provided in this report and during spring JTC and Yukon River Panel meetings must be regarded as preliminary and subject to change as further refinements and levels of review occur.

2015 CHINOOK SALMON MANAGEMENT, HARVEST, AND ESCAPEMENT SUMMARY IN ALASKA AND CANADA

The preseason projection for the Canadian Yukon Chinook salmon run in 2015 was 59,000–70,000 fish. The total drainagewide run size projection was expected to be roughly twice the Canadian run, 118,000–140,000 fish. The pre-season management expectation was that the 2015 Chinook salmon run size would likely be near the lower end of this range. Before the 2015 season, the Yukon River Drainage Fisheries Association (YRDFA) facilitated a meeting with U.S. management agencies (ADF&G and USFWS), fishermen, tribal council representatives, and other stakeholders to develop a preseason management strategy. The purpose of this meeting was to cooperatively identify practical management strategies that would achieve the following goals: ensure adequate numbers of Chinook salmon reach their spawning grounds in Alaska and Canada, minimize the harvest of Chinook salmon, and provide ample opportunity to harvest abundant summer chum salmon and non-salmon species.

Ice break up in the lower Yukon River occurred May 18 to 19, a week earlier than the average break up date of May 25 (1961–2014). The Lower Yukon Test Fishery was operational at the South Mouth site on May 28 and at the Middle Mouth site on June 6. The first Chinook salmon was caught in the test fishery on May 28. The first quarter point, midpoint, and third quarter point were June 15, June 25, and June 30, respectively. The preliminary cumulative passage estimate at the mainstem Yukon River sonar project at the mainstem Yukon River sonar project near Pilot Station was approximately 116,000 ± 30,000 (90% CI) Chinook salmon, which was below the historical average of 143,600. The first quarter point, midpoint, and third quarter point for the mainstem Yukon River sonar project operated near Pilot Station were on June 18, June 24, and June 29, respectively. The 2015 Chinook salmon run began entering the river early, but overall run timing was close to historical average. As the Chinook salmon run progressed, inseason assessment projects indicated that the Chinook salmon run was better than anticipated; however, it was still a below average run.

Inseason genetic mixed stock analysis (MSA) on the first pulse of Chinook salmon at the mainstem Yukon River sonar project operated near Pilot Station (May 30–June 17) indicated that 50% were Canadian-origin Chinook salmon. Genetic MSA on the second pulse of Chinook salmon at the sonar (June 18–25) indicated that 39% were Canadian-origin Chinook salmon. Samples analyzed from June 26–July 2 indicated that 31% were from Canadian-origin Chinook salmon. The results of the genetic MSA suggested a weaker contribution of the Canadian-origin stock to the overall Chinook salmon run size than in 2014.

Subsistence harvest in Alaska is estimated through an extensive village by village door to door postseason survey, conducted in person. Based on survey and permit data, the preliminary 2015 subsistence salmon harvest in the Alaska portion of the Yukon River drainage was estimated to be 6,640 Chinook salmon, only about 25% of the average harvest of 25,100 fish during the previous 5 years (2010-2014). This estimate includes all Chinook salmon received by local households from test fishery projects and all Chinook salmon retained for household use from commercial catches. No commercial or sport harvest of Chinook salmon occurred in 2015.

In Canada, management of Chinook salmon is set out in the Integrated Fisheries Management Plan. One component of the plan is the inseason fishery management decision matrix. The decision matrix sets out management strategies and actions under different run sizes. In 2015, based on recommendations of the YSSC, a midpoint management target of 48,750 was used to guide inseason management decisions. Based on the poor preseason forecast, it was expected that the commercial and domestic fisheries would be closed all season, that a conservative approach would be required for the recreational fisheries (i.e., non-retention and fishery closures), and that the allocation to the First Nation fishery would be removed until inseason assessment suggested that the spawning escapement goal would be met.

Throughout the season, DFO, the YSSC, and First Nation salmon managers held weekly teleconferences to discuss the latest run assessment information and projections. As inseason assessments showed that the run was better than anticipated and the spawning escapement goal (and management target) would be met, an allocation to the First Nation fisheries was made available. Yukon First Nation Governments continued to follow very conservative management plans resulting in severely reduced or, in many cases, zero harvest for 2015.

In Canada, inseason harvest information for the Upper Yukon River was collected in 2015 by First Nations within their respective Traditional Territories, as part of the implementation of the First Nation Final Agreements. In some cases, interviews were conducted inseason to obtain detailed catch, effort, gear, and location information at fish camps or in the community, 1–3 times weekly. In most cases, weekly summaries were completed by the surveyors and e-mailed to the DFO office in Whitehorse. Late or incomplete information was obtained postseason and reviewed by First Nation staff in conjunction with DFO. The Yukon River Chinook salmon harvest in Canada was estimated to be 1,000 fish, all from the aboriginal fisheries.

2015 Fall Chum and Coho Salmon Management, Harvest, and Escapement Summary in Alaska and Canada

In Alaska, initial management was based on the preseason run projection of 700,000 to 800,000 fall chum salmon. All districts and subdistricts were placed on their full regulatory subsistence fishing schedules commensurate with switching over to fall management. By August 8, subsistence fishing in all mainstem districts (1-5) was open 7 days per week, 24 hours per day. The preliminary fall chum salmon passage estimate at the mainstem sonar project operated near Pilot Station was 546,894 fish ± 44,039 (90% CI), which is below the historical median of 622,049 fish. Run timing for fall chum salmon averaged 3 days late over all the assessment projects.

The preliminary coho salmon passage estimate at the sonar project operated near Pilot Station was 97,587 fish ± 15,280 (90% CI), which is below the historical median of 121,023 fish. A portion of the coho salmon run is missed because the mainstem sonar operations cease prior to the completion of the run. Run timing for coho salmon was average. A surplus of coho salmon salmon in addition to what was harvested in the fall chum salmon commercial fishery was identified, a coho salmon directed fishery was opened in Districts 1 and 2 from September 1–5.

In Alaska, summer chum, fall chum, and coho salmon runs were strong enough to support escapement, subsistence, and commercial fishing, but the fisheries were subject to restrictions to conserve Chinook salmon. Fall chum salmon harvests are not currently separated into major stock groups by genetic analysis. The total commercial harvest of U.S. and Canadian combined stocks in the Alaska portion of the drainage was 191,470 fall chum and 129,700 coho salmon. Fall chum salmon commercial harvest was above the most recent 5-year (2010–2014) and 10-year (2005–2014) averages. In U.S. subsistence fisheries estimated total of 86,143 fall chum, and 17,914 coho salmon were also harvested (combined U.S. and Canadian-origin stocks). These harvests were similar in size to 5-year averages (2010–2014) of 89,022 fall chum and 15,643 coho salmon. In Canada, the total 2015 fall chum salmon harvest from aboriginal, commercial, and domestic fisheries was 3,897 fish in the mainstem Yukon River. Fall chum salmon harvest in the Canadian portion of the Porcupine River was 556 fish.

Estimated fall chum escapement in the mainstem Yukon River in Canada was about 108,000 fish, exceeding the upper end of the IMEG (70,000–104,000 fish). In the Porcupine River drainage, assessment of fall chum at the Fishing Branch weir estimated an escapement of 8,400 fish. An alternate method of calculating escapement (Porcupine River sonar with radiotelemetry proportions for Fishing Branch River) suggested 15,000 fish. Both estimates confirm the fall chum salmon escapement goal for the Fishing Branch River IMEG (22,000–49,000 fish) was not met. The JTC is considering whether the fall chum salmon stock on the Porcupine River is experiencing declining productivity in relation to other upper Yukon River fall chum salmon

stocks. Note that this report does not contain management summary tables for upper Yukon River fall chum salmon, but the JTC plans to include them in the future.

2016 OUTLOOKS

For Chinook salmon, the preseason outlook range for Canadian-origin upper Yukon River Chinook salmon is 65,000 to 88,000 fish, suggesting that the 2016 Canadian-origin upper Yukon River Chinook salmon run may be near or above the recent average (68,000 fish 2007–2015) and similar to the run observed in 2015.

The summer chum salmon outlook indicates the run could provide for escapements, a normal subsistence harvest, and a surplus for commercial harvest. Similar to the last several years, actual commercial harvest of summer chum salmon in 2016 will likely be affected by conservation measures on a potentially poor Chinook salmon run.

For fall chum salmon, the drainagewide forecast is 550,000 to 780,000 fish, which is below average for even-numbered year runs (1974–2014). However escapement goals are expected to be met and normal subsistence fishing opportunity and harvests are also expected. The preseason outlook range for Canadian-origin Yukon River (Mainstem) fall chum, based on the drainagewide outlook, is 137,000 to 195,000 fall chum salmon. This is below the 1998–2015 average run size of 214,000 fish. The 2015 Fishing Branch River outlook range is 22,000 to 31,000 fish.

2016 ESCAPEMENT GOAL RECOMMENDATIONS

In 2010, the Panel adopted an interim management escapement goal (IMEG) range of 42,500 to 55,000 Chinook salmon, to allow for the uncertainty of information from assessment projects. The IMEG has been retained each year since then. In the absence of a biological escapement goal, the JTC recommends retaining this IMEG range again in 2016.

For fall chum salmon, the JTC likewise recommends that the upper Yukon interim management escapement goal (IMEG) remain 70,000 to 104,000 fall chum salmon as established in 2010. In the absence of new information, the JTC likewise recommends that IMEG for Fishing Branch River fall chum salmon remain at 22,000 to 49,000 fish.

Appendix D2.–Yukon River Panel escapement goals, total allowable catch targets, and estimated postseaon run size and spawning escapement for upper Yukon River Chinook salmon, 2001–2015.

Year	Yukon River Panel or Interim Management Escapement Goal (IMEG) [a]		Estimated upper Yukon Chinook Salmon run size [b]	Total allowable catch (TAC)		Estimated spawning escapement [c]
	from	to		from	to	
2001	18,000	28,000	85,663	57,663	67,663	52,564
2002	28,000	28,000	81,486	53,486	53,486	42,359
2003	25,000	28,000	149,979	121,979	124,979	80,594
2004	28,000	28,000	117,247	89,247	89,247	48,469
2005	28,000	28,000	123,612	95,612	95,612	67,985
2006	28,000		119,485		91,485	62,630
2007	33,000	43,000	87,899	44,899	54,899	34,904
2008	45,000		62,637		17,637	33,883
2009	45,000		87,682		42,682	**65,278**
2010	42,500	55,000	59,736	4,736	17,236	32,009
2011	42,500	55,000	71,719	16,719	29,219	46,307
2012	42,500	55,000	48,494	0	5,994	32,656
2013	42,500	55,000	37,177	0	0	28,651
2014	42,500	55,000	64,804	9,804	22,304	**63,306**
2015 [d]	42,500	55,000	87,311	32,311	44,811	**82,674**

Note: TAC range is calculated by subtracting each end of the goal range from the estimated run size. This is established in Appendix II of the Yukon River Salmon Agreement.

[a] IMEGs are not biologically based escapement goals.

[b] Estimated run size is the border passage estimate plus the Alaska and Canadian harvest of Canadian-origin Chinook salmon. Border passage estimates incorporate: radiotelemetry data (2002–2004); Eagle sonar estimates (2005–2015); and the relationship between telemetry/sonar to aerial surveys for 2001. Harvest estimates are determined using Canadian stock genetic proportion estimates applied to Alaska harvest.

[c] Gray shaded boxes indicate years when escapement goal was not achieved; **bold font** indicates escapement *above* the goal range).

[d] 2015 estimates are preliminary.

Appendix D3.–Summary of Chinook salmon harvests (Canadian-origin fish) and conservation measures implemented in the U.S., 2001–2015.

Year	U.S. Allowable Catch 74% from	U.S. Allowable Catch 80% to	U.S. Harvest [a]	U.S. Exploitation Rate	U.S. Average Harvest 2001–2007	Management Actions (Commercial)	Management Actions (Subsistence)
2001	35,211	46,066	23,325	0.31			
2002	38,104	41,194	30,058	0.38		Chinook commercial fishing shifted to midpoint of run and later	
2003	66,017	73,770	59,939	0.51	44,586	Chinook commercial fishing shifted to midpoint of run and later	
2004	57,692	62,370	57,832	0.55		Chinook commercial fishing shifted to midpoint of run and later	Subsistence fishing schedule implemented (and continued in following years)
2005	43,703	47,246	44,650	0.51		Chinook commercial fishing shifted to midpoint of run and later	
2006	42,044	45,453	48,097	0.57	Percent Reduction in Harvest from 2001–2007 Average		
2007	20,335	29,984	48,201	0.68			
2008	13,051	14,110	25,328	0.40	43.2%	Chinook commercial fishing closed	Protection on 2nd and 3rd pulses
2009	31,585	34,146	17,646	0.20	60.4%	Chinook commercial fishing closed and no sale of incidental catch; summer chum fishing delayed.	1st and 2nd pulse closure
2010	3,505	13,789	25,271	0.42	43.3%	Chinook commercial fishing closed; summer chum fishing delayed	
2011	12,590	23,610	20,823	0.29	53.3%	Chinook commercial fishing closed and no sale of incidental catch; summer chum fishing delayed; summer chum fishing restricted to certain areas of low Chinook abundance.	1st and 2nd pulse closure; additional fishing time reductions in upper districts; 7.5" mesh size restriction all season
2012	4,544	4,912	13,841	0.28	69.0%	Chinook commercial fishing closed and no sale of incidental catch; summer chum fishing delayed and restricted to areas of low Chinook abundance; chum fish wheels attended at all times and Chinook released alive.	1st and 2nd pulse closure; additional fishing time reductions in upper districts; 6" mesh size restriction after closures
2013	0	0	6,604	0.17	85.2%	Chinook commercial fishing closed and no sale of incidental catch. Summer chum fishing with beach seines and dip nets, all Chinook released alive. Gillnet summer chum fishing restricted to 5.5" and 30 meshes; delayed and restricted to areas of low Chinook abundance; chum fish wheels attended at all times and Chinook released alive.	1st, 2nd and 3rd pulse closures - limited opportunity in between pulses; additional fishing time reductions in upper districts; 6" mesh size restriction all season

-continued-

Year	U.S .Allowable Catch 74% from	U.S .Allowable Catch 80% to	U.S. Harvest [b]	U.S. Exploitation Rate	Percent Reduction in Harvest from 2001–2007 Average	Management Actions (Commercial)	Management Actions (Subsistence)
2014[a]	7,255	17,843	1,398	0.02	96.9%	Chinook commercial fishing closed; liberal opportunity for summer chum fishing with beach seines and dip nets - all Chinook released immediately and alive; 6" or smaller gillnet summer chum fishing delayed until majority of Chinook run complete; no sale of incidental Chinook; chum fish wheels had to be attended at all times and all Chinook released immediately to the water; concurrent subsistence and commercial openings.	Entire mainstem river closed to Chinook-directed fishing; no gillnets allowed greater than 4" mesh size to harvest non-salmon species; opportunity to harvest summer chum salmon in Districts 1-4 using elective gear that allows immediate and live release of Chinook allowed (dip nets, beach seines, and fish wheels); short openings with 6" or smaller gillnets allowed in each districts after >90% of Chinook salmon run had passed through; >99% in District 5.
2015[a]	23,910	35,848	3,681	0.04	91.7%	Chinook commercial fishing closed; liberal opportunity for summer chum fishing with beach seines and dipnets - all Chinook released immediately and alive; 6" or smaller gillnet summer chum fishing delayed until majority of Chinook run complete; no sale of incidental Chinook; chum fish wheels had to be attended at all times and all Chinook released immediately to the water; concurrent subsistence and commercial openings.	Entire river closed to Chinook-directed fishing; no gillnets allowed greater than 4" mesh size to harvest non-salmon species; opportunity to harvest summer chum salmon in Districts 1-4 using selective gear that allows immediate and live release of Chinook (dipnets, beach seines, and fish wheels); short openings with 6" or smaller gillnets allowed in each district between pulses of Chinook salmon when summer chum abundance was high. Subsistence fishing was allowed in Subdistrict 5-D on the early trickle of Chinook salmon. Subsistence schedules liberalized in Districts 4 and 5 once Chinook salmon border escapement was surpassed.

[a] Gray shaded boxes indicate year when allowable harvest range was exceeded.

[b] 2015 estimates are preliminary.

Appendix D4.–Summary of Chinook salmon harvests and conservation measures implemented in Canada, 2001–2015.

Year	Canada Allowable Catch 20% from	Canada Allowable Catch 26% to	Canada Harvest [a]	2001–2007 Average Harvest	Management Actions by Canada (Commercial, Domestic, recreational)	Management Actions by Canada (Subsistence)
2001	9,517	14,972	9,774		Test fishery implemented in early season; commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2002	10,298	13,388	9,070		Test fishery implemented in early season; commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2003	17,842	23,975	9,446	9,109	Test fishery implemented in early season; commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2004	15,592	20,270	10,946		Test fishery implemented in early season; commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2005	11,812	15,355	10,977		Commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2006	11,363	14,772	8,758	Percent Reduction in Harvest from Average	Commercial/domestic openings determined by weekly estimates of abundance, recreational open	Unrestricted
2007	5,496	9,745	4,794		Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River	Unrestricted
2008	3,527	4,586	3,399	62.7%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River	Voluntary reduction in harvest
2009	8,536	11,097	4,297	52.8%	Commercial/domestic openings determined by weekly estimates of abundance, recreational open	Voluntary reduction in harvest in early season
2010	947	4,481	2,456	73.0%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery.	Voluntary reduction in harvest
2011	3,344	7,597	4,594	49.6%	Chinook commercial/domestic fishing closed; recreational fishing varied to non-retention in the recreational fishery, angling closure at Tatchun River, recreational restrictions lifted late in the season	Voluntary reduction in harvest in early season
2012	1,199	1,558	2,000	78.0%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River	Voluntary reduction in harvest
2013	0	0	1,904	79.1%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River and Teslin River	Voluntary reduction in harvest
2014	1,961	5,799	100	98.1%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River and Teslin River	Regulatory removal of TAC until 3rd quartile, voluntary reduction or closure by majority of First Nations.
2015 [b]	6,462	11,651	1,000	89.0%	Chinook commercial/domestic fishing closed; varied to non-retention in the recreational fishery, angling closure at Tatchun River	Regulatory removal of TAC until 3rd quartile, voluntary reduction or closure by majority of First Nations.

Note: The "Total Allowable Catch" range (Appendix D2) is multiplied by 20% and 26% to calculate the "Canada Allowable Catch" range reported here.

[a] Gray shaded boxes indicate years when allowable harvest range was exceeded.

[b] 2015 estimates are preliminary.